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[1]This hypothesis has been tested on a non-representative sample of fifteen universities across three continents. I was lucky enough to attend classes at four of them throughout my education, while I visited the other ones during conferences.

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Samenvatting

Economische integratieakkoorden (EIA) zijn steeds belangrijker geworden in de laatste twee decennia: zowel wat het aantal landen betreft dat handelsakkoorden afsluit, de getroffen handelsstromen, de verwijdering van handelsbelemmeringen als de betrokken beleidsdomeinen.

Dit proefschrift wil bijdragen tot het begrijpen van hoe deze overeenkomsten worden onderhandeld en welke impact ze hebben, aangezien dit belangrijk is voor zowel academici als beleidsmakers en goed geïnformeerde burgers.

In de eerste twee essays van deze verhandeling bestudeer ik de impact van EIA's tussen de Europese Unie en de rest van de wereld op productniveau. Ik vind dat EIA's een handelscrerende impact hebben, dit zowel voor alsook nadat handelsakkoorden in werking treden. De handelsstromen beginnen toe te nemen vanaf het moment dat de onderhandelingen over de handelsovereenkomst beginnen en dit handelscreërend effect houdt aan tot vijf jaar na de inwerkingtreding van het handelsakkoord. Vooral het aantal producten dat wordt uitgevoerd naar een bestemming (de extensieve marge) neemt toe, maar er is een grote heterogeniteit tussen de verschillende handelsakoorden en EU-lidstaten.

In een derde essay bevestig ik deze bevindingen op bedrijfs-niveau met behulp van gedetailleerde data van Belgische exportbedrijven. Ik vind dat handelsakkoorden grote kansen bieden voor bedrijven en dat bedrijven hiervan gebruik maken. Toch vind ik opnieuw grote heterogeniteit in de effecten van handelsakkoorden: vooral oudere bedrijven en bedrijven met 50 tot 99 werknemers halen hier voordeel uit.

In een vierde en laatste essay bestudeer ik het onderhandelingsproces van EIA's. Ik vind dat de *market power* van een product een goede voorspeller is van de uitkomst van de bilaterale handelsbesprekingen voor dat product, alsook het lobbywerk van bedrijven. Producten met meer *market power* en producten uit import-concurrerende sectoren die politiek georganiseerd zijn om te lobbyen, hebben een grotere kans om uitgesloten te worden van liberalisering in een vrijhandelsakkoord.

Summary

Economic Integration Agreements (EIAs) have been gaining importance in the last two decades in terms of number of countries concluding them, trade flows covered, trade barriers removed and policy domains covered. This dissertation wants to add to the understanding of how these agreements are negotiated and what impact they have, as this is important for academics as well as policymakers and well-informed citizens.

In the first two essays of this dissertation, I study the effects of EIAs between the European Union and the rest of the world on the product-level. I find that EIAs have trade-creating effects. This before as well as after entry into force of the agreement. Trade flows start increasing from the moment negotiations of the trade agreement start and this trade creating effect continues up to five years after entry force of the agreement. Especially the number of products exported to a destination (the extensive margin) increases, yet there is great heterogeneity between agreements and EU member states.

In a third essay, I confirm these findings on the firm-level using detailed data from Belgian firms. I find that trade agreements present great opportunities for firms, and firms make use of them. Yet, there is again large heterogeneity in the effects of trade agreements: mainly older firms and firms with 50 to 99 employees benefit from trade agreements.

In the fourth and last essay, I study the negotiation process of EIAs. I find that the market power of a product is a good predictor of the outcome of bilateral trade negotiations for that product, as well as the lobbying efforts of firms. Goods with higher market power and goods from import-competing sectors that are politically organized to lobby are more likely to be excluded from liberalization in the trade agreement.

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Chapter 1

Introduction

Once upon a time, in a small kingdom that would later be known as Belgium, there was a small brewery. In that brewery, unlike in other breweries, they made beer that spontaneously ferments by being exposed to wild yeasts and bacteria native to the area. This process gives the beer - which is now known as Lambic - its very distinctive flavour: dry, vinous, and cidery, usually with a sour aftertaste. People liked the beer, and so the founder and head brewer passed on the recipe and all his knowledge to his son. A tradition was born. The brewery flourished, and generations of Timmermans were employed in the brewery, passing on the secrets of the delicious beer from father to son. Today, Timmermans Oude Gueuze has been crowned World's Best Sour Beer (World Beer Awards 2015), and brewery Timmermans is the oldest Belgian brewery of Lambic beers.

Business was going well, and so brewery Timmermans looked for opportunities to expand. However, when they wanted to export to Mexico, they ran into a problem. Not only did they have to fill out some paperwork to be allowed to export their fabulous Gueuzes, the Mexican customs authority also charged their product called "22030001"[1] a 20% import tariff. This outpriced their product compared to local Mexican beers.

All of this changed in the year 2000. After long talks between the European Union and the Mexican government, the EU and Mexico signed the EU-Mexico Free Trade Agreement. In the agreement, which entered into force on July first, 2000, it was decided that Mexico would abolish its tariffs on malt beers. As exporting Gueuze to Mexico now became 20% cheaper, the Timmermans brewery saw an opportunity and introduced its delicious beers into the Mexican market.

[1] This code refers to the product codes used by the Mexican customs authorities to identify imported goods. The first six digits refer to the Harmonized Commodity Description and Coding System, generally referred to as Harmonised System (HS), a multipurpose international product nomenclature developed by the World Customs Organization (WCO). The system is used by more than 200 countries and economies as a basis for their Customs tariffs and for the collection of international trade statistics. The last two digits are defined by the Mexican authorities.

Today, multilateral and bilateral trade agreements define and shape almost all of world trade. While big parts of world trade were liberalized multilaterally, there has been a strong shift towards more bilateral and hence discriminatory trade liberalization in the last two decades. Once the driver of trade liberalizations worldwide, the World Trade Organization (formerly the General Agreement on Tariffs and Trade or GATT) has not made much progress in liberalizing trade further in recent years. The latest round of multilateral trade negotiations started in 2001 in Doha. But after a breakdown in the negotiations in 2008 over disagreements over agriculture, industrial tariffs and non-tariff barriers, services, and trade remedies, no substantial progress has been made, leaving the future of the liberalizations of the Doha Development Round uncertain. As a result, countries have increasingly resorted to bilateral trade agreements. It is therefore important - for academics, as well as policymakers and well-informed citizens - to understand the impact bilateral trade agreements have on the economy, and on society and the world more in general. This dissertation wants to contribute to this growing body of knowledge.

So what are trade agreements? And why do they exist? The remainder of this chapter introduces the concept of trade agreements, and puts them into a wider context. The organisation is as follows. Section 1.1 gives a definition of trade agreements and discusses certain central points of the definition, while section 1.2 puts trade agreements in a historical perspective. Section 1.3 presents some stylized facts, and section 1.4 focuses on the reason why countries decide to conclude trade agreements. Finally, section 1.5 discusses the costs that trade agreements can entail, while section 1.6 presents a road map of this dissertation.

1.1 A definition of trade agreements

Preferential trade agreement, partial scope agreement, preferential trade arrangement, regional trade agreement, regional integration agreement, free trade agreement, free trade area, association agreement, economic partnership agreement... The economics literature uses different terms for trade agreements interchangeably, without a clear definition. Moreover, some terms and acronyms have been used by different scholars and institutions to denote different things. PTA for example, is used by economic scholars to denote any discriminatory trade agreement, while in the framework of the WTO, the term is used to denote a very specific kind of trade agreements, namely non-reciprocal trade preferences given to developing countries and non-reciprocal preferential schemes that have been granted a waiver by the General Council (WTO, 2016).

In this dissertation, I will use the inclusive term “economic integration agreements” (EIA) to denote trade agreements, clearly defined by Baier et al. (2008) as “treaties between economic units - in the case of international

EIAs, between nations - to reduce policy-controlled barriers to the flow of goods, services, capital, labour, etc".

This definition consists of some crucial points. First of all, EIAs are concluded between two or more countries and hence may be bilateral, regional, interregional or plurilateral[2]. These countries may belong to the same geographical region or continent, or not. As such, EIAs are inherently discriminatory. This is especially true when juxtaposing EIAs with the more inclusive multilateral WTO system. By their nature, EIAs create multiple sets of rules: one set of rules that applies to all countries that are members of the group, and another set of rules that applies to the other countries, and that are less favourable than the first[3]. By only negotiating with a subset of countries, EIAs can move "beyond the minimum common denominator established by the existing multilateral system and undertake new and complex policy initiatives that are difficult to broach at the multilateral level" (UNCTAD, 2006).

Second, EIAs facilitate international trade and cross-border movement of the factors of production somehow. As such, economic integration agreements may address integration of the goods, services, capital, or labour market or a combination of them. They may cover transactions that take place between countries and they may also address activities that occur inside the borders of a country that may affect such international flows. The depth of integration in terms of the barriers to trade it tries to remove and the range of activities it covers, can vary considerably across agreements.

Third, EIAs can be reciprocal or non-reciprocal. Countries can unilaterally grant better market access to one or multiple partner countries without asking for better market access in return. Or the removal of barriers to trade in one country will be accompanied by the removal of barriers to trade in the partner country or countries[4]. Countries can also choose

[2]This excludes multilateral agreements, which are concluded between a large number of countries, usually including all contracting parties of an agreement such as the General Agreement on Tariffs and Trade (GATT) or all countries that are members of a large international organization such as the World Trade Organization (WTO). Within the context of the World Trade Organization (WTO) in particular, plurilateral agreements are signed by, and apply to, only those countries that choose to do so (see for example the 'Agreement on Trade in Civil Aircraft' which has thirty signatories today), while all WTO members must be party to the multilateral agreements. Given that multilateral EIAs are not addressed in this dissertation, I will use the term "EIA" or "trade agreement" throughout this dissertation to indicate non-multilateral EIAs, unless otherwise stated.

[3]Note that this second set of rules does not imply that every partner country to the EIA has the same rules for non-member countries. While there are types of EIAs where the members decide jointly on external trade policy, in the more general case, each EIA partner country sets its own trade policy independently.

[4]Note that I use reciprocity of trade agreements in a broad sense here, as is common in the economics literature. Reciprocal trade agreements - where all partners of the agreement remove some of the barriers they impose on trade - are the opposite of unilateral trade agreements in this perspective. This in contrast to the notion of reciprocity in trade negotiations in the context of the WTO, where reciprocity implies the exchange of a reduction in the level of protection in one country in return for an

to remove virtually all barriers to trade, or just single out some sectors. Finally, the definition does not specify the motivation for concluding an EIA. And hence, EIAs can be concluded for any number of reasons, ranging from purely economic motives, to purely political motives, and anything in between.

Baier et al. (2008), based on Frankel (1997), distinguish six types of EIAs, reflecting different intensities of trade integration.

1. Non-reciprocal PTAs (NRPTA or OPTA) provide one-way preferential tariffs. They grant access to a larger market without a demand for reciprocity. The Generalised Scheme of Preferences (GSP) is the largest initiative, with a handful of developed countries such as Australia, the EU and the US granting a substantial number of developing countries access to their market.

2. Reciprocal PTAs (RPTA or TWPTA) provide two-way preferences on only part of the trade, e.g. the Latin American free trade area, which started in 1960.

3. Free Trade Areas (FTA) provide two-way preferences and eliminate substantially all tariff and non-tariff barriers between partner countries. The most well-known FTA is the North-American FTA (NAFTA) between the US, Mexico and Canada.

4. Customs Unions (CU) are similar to FTAs, with the exception that member states adopt a common external tariff on imports from third countries. Examples are the Turkey-EU Customs Union, and the Caribbean Community and Common Market (CARICOM).

5. Common Markets (CM) are customs unions that are supplemented with free factor mobility across national member frontiers. Capital, labour, technology and firms are thus allowed to move unhindered between the member states of the common market. A classroom example is the European Union.

6. Economic Unions (EU) are common markets with additional monetary and fiscal policy coordination such as the Euro area countries.

The process of integration does not necessarily have to be gradual from one type to another, nor does it have to be linear nor monotonically increasing.

equivalent reduction in the level of protection of another country. Reciprocity may be intra- or inter-issue, with the former entailing concessions of an identical nature, and the latter the exchange of concessions of a dissimilar nature. Finally, reciprocity may be product-specific or more general in nature (Hoekman and Kostecki, 2009).

Table 1.1: Components of the different types of economic integration agreements.

	OPTA	TWPTA	FTA	CU	CM	EU
Removal of some tariffs	yes	yes	yes	yes	yes	yes
Removal of some tariffs both partners	no	yes	yes	yes	yes	yes
Removal of most tariffs both partners	no	no	yes	yes	yes	yes
Common external tariff	no	no	no	yes	yes	yes
Free movement of factors	no	no	no	no	yes	yes
Common monetary and fiscal policy	no	no	no	no	no	yes

1.2 A brief history of trade agreements

The history of trade agreements is inevitably a history of nations. Before the rise of the concept of the nation state, it is difficult to speak of trade agreements, as there is little need for cooperation on trade matters when empires are so vast the sun never sets on them[5]. Moreover, the many caravans transporting silk, spices, perfume and other exotic goods along the Silk road are only one of the countless examples of periods of free trade during history. It is only when nations start restricting trade that the opportunity for bilateral trade cooperation arises. Finally, the idea that international agreements can secure trade interests is relatively modern, dating mainly from the 18th and 19th centuries (Trebilcock and Howse, 1995). Early commercial treaties were less concerned with opening up new markets and liberalizing trade than with ensuring that a country's traders enjoyed protection from arbitrary arrest and seizure in foreign countries.

Though England and Portugal signed the Methuen Treaty in 1703 – stipulating among other things that Portuguese wines imported to England would be subject to a third less duty than wines imported from France, and that English woollen cloth imported to Portugal would enter duty free (WTO, 2011) - the Cobden-Chevalier Treaty is often considered to be the first "real" free trade agreement (IMF, 1997). Signed on 23 January 1860 in Paris, it held the promise of freer trade between Britain and France, by including significant reciprocal tariff reductions and a Most Favored Nation (MFN) clause. The treaty helped pave the way for more trade liberalization initiatives in quickly industrializing Europe. A veritable explosion of bilateral trade pacts followed, with an additional 56 treaties being signed within fifteen years. By 1875, virtually all of Europe was party to a low-tariff zone through a web of agreements that included the linchpin MFN clause (Grossman, 2016).

The first modern customs union was concluded in 1933, when German states signed the *Zollverein* treaties, forming a coalition to manage tolls after the dissolution of the Holy Roman Empire. The splintering of territory

[5]The phrase was originally used to refer to the Spanish Empire in the 16th and 17th empire, but has most notably been used in reference to the British Empire in the 19th and 20th century. A similar concept also existed in Ancient Egypt.

and states over generations meant that by the 1790s in the German-speaking Holy Roman Empire in Central Europe, there were approximately 1800 customs barriers. Even within the Prussian state itself there were at the beginning of the 19th century over 67 local customs and tariffs with as many customs borders. To travel from Knigsberg in East Prussia to Cologne, for example, a shipment was inspected and taxed 18 times (Seidel, 1971; Price, 1949).

By the late 19th century, however, the momentum towards a more open, less preferential trading system was gone. The worldwide depression from 1873 to 1877 increased pressure for more domestic protection and weakened the drive for access to foreign markets (Shafaeddin, 1998), while the First World War wiped out any remnants of the more open and integrated world trading system that had been built up over the previous century. To make matters worse, the Great Depression of the early 1930s and the spread of "beggar-thy-neighbour" trade policies, resulted in the collapse of international trade and the rise of trade frictions (Irwin, Mavroidis, and Sykes, 2008). One bright spot in these chaotic times was the enactment of the Reciprocal Trade Agreement Act by the US Congress in 1934. This Act gave the Roosevelt administration the authority it needed to conclude more than twenty bilateral tariff reduction agreements in the late 1930s. This initially with Latin American countries, but later also with Britain and Canada (Irwin, Mavroidis, and Sykes, 2008). Even though these bilateral agreements only had a marginal effect on world trade, they signalled a new liberal direction in US trade policy, and laid the foundations for much of the multilateral trade system after the Second World War.

The General Agreement on Tariffs and Trade (GATT) went into effect on January 1, 1948, and incorporated more than 45,000 tariff concessions by its original 23 signatories, while also providing a broader framework for regulating international trade. Seven subsequent rounds of negotiations by these and additional participants led to innumerable further tariff cuts and to the introduction of rules governing various non-tariff barriers to trade. The creation of the GATT, however, did not diminish the attraction of bilateral or regional approaches to international trade relations. On the contrary, the push for new regional agreements, especially in Europe, re-emerged less than five years after the GATT was launched. I distinguish three waves of regionalism since the second half of the 20th century.

The first wave of regionalism occurred in the late 1950s and 1960s. At its centre was Europe's push for continental integration – starting with the sectoral European Coal and Steel Community in 1951, leading to the broader European Economic Community (EEC) in 1957, and building outwards to current or past colonial possessions through a complex network of preferential, but non-reciprocal trade arrangements (Winters, 1993). This evolving European Community helped spark the creation of the rival European Free Trade Association (EFTA) in 1957 among countries that had chosen to stay outside of the Community. The EEC was also taken

as a model by groups of developing countries in Africa, the Caribbean, Central and South America which rushed to form their own regional and subregional unions during this period. However, most of these arrangements – including even the most promising, the East African Community and the Central American common market – had collapsed or were put on the backburner by the end of the 1970s (de Melo and Panagariya, 1993).

The second wave of regionalism began roughly in the mid-1980s and extended well into the 1990s. Once again Europe's drive to expand and deepen its economic integration was a central impetus. The mid-1980s saw Europe embark on its Single Market programme, aimed at dismantling the remaining physical, technical and tax barriers within the community by 1992. The European Community was also pushing to create a new cluster of bilateral PTAs with Central and Eastern European countries following the break-up of the Soviet Union and the dissolution of the Council for Mutual Economic Assistance (COMECON) (Lester and Mercurio, 2009). In the mid-1990s, the EU also concluded a number of bilateral agreements with countries in the Middle East and North Africa with the intention of forming an open trade area around the Mediterranean Sea.

While the first wave was mainly a European affair, momentum behind the second wave of regionalism also came from the United States. This partly because of its frustration with delays in launching and then advancing the GATT's Uruguay Round negotiations. Having steered clear of regionalism in favour of multilateralism for almost forty years, the United States shifted strategies and started bilateral negotiations that led to the free trade agreement with Israel in 1985 and the Canada-US Free Trade Agreement in 1988, later converted into NAFTA by including Mexico in the early 1990s (Anderson and Blackhurst, 1993).

As with the previous wave of regionalism, this wave had a demonstration effect with groups of developing countries establishing and strengthening their own regional groupings. In Latin America, old integration arrangements such as the Central American Common Market and the Andean Community were revived in an effort to build a broader and more ambitious Latin American Common Market. Perhaps the most prominent example of a new generation of developing-developing country EIAs was Mercosur (Southern Common Market). Envisaged as a full customs union among Argentina, Brazil, Paraguay and Uruguay, it reflected a desire to strengthen political relations between Argentina and Brazil, as well as to counterbalance other emerging continental EIAs, and to create a stronger and more unified voice for the member countries in the multilateral trade system (Mansfield, Pevehouse, and Bearce, 2000).

In Asia, regionalism gathered pace as well. The South Asian Association for Regional Cooperation was created at this time in part to try to reduce political tensions between India and Pakistan (Dash, 1996). It was later transformed into the South Asian Free Trade Area (SAFTA). The Association of Southeast Asian Nations (ASEAN) embarked on plans

for a Free Trade Area (AFTA), in order to strengthen the resilience of ASEAN member countries to economic crises and to enhance cooperation in non-traditional trade areas such as science and technology, agriculture, financial services and tourism. Most ambitious of all, the Asia Pacific Economic Cooperation (APEC) was launched in 1989 with the goal of "pursuing free and open trade and investment" among its founding twelve members on a non-preferential basis (Pomfret, 2006). Around the same time, Australia and New Zealand deepened their free trade area into the Closer Economic Relations (CER).

In Africa too, initiatives were launched to revitalize existing regional groupings and to form new ones with the objective of accelerating industrialization, diversifying economies, developing regional infrastructure, encouraging the adoption of common negotiating positions, and promoting peace and security on the continent. In particular, the Common Market for Eastern and Southern Africa (COMESA) was seen as a stepping stone towards the realization of an African Economic Community, while the Southern African Development Community (SADC) represented an effort to reintegrate South Africa into the post-apartheid regional economy (Hwang, 2007).

Over the past decade, another wave of regionalism has been gathering force, driven as before by key trade powers, such as the EU and the United States, but for the first time also including many Asian countries that had previously been the strongest supporters of multilateralism and non-discrimination. Their conversion to regionalism can be traced in part to the international community's inadequate reaction to the collapse of Asian trade following the Asian financial crisis in 1997, the high-profile collapse of the WTO's Seattle Ministerial Conference in 1999, and the diminishing significance of pan-Pacific initiatives, especially the APEC Forum (Aggarwal and Koo, 2005). Even more importantly, the proliferation of regional agreements in Asia also appears to reflect and reinforce an underlying process of deep economic integration. This was caused by countries being woven ever more tightly together by the trade and investment flows associated with regional and subregional production networks.

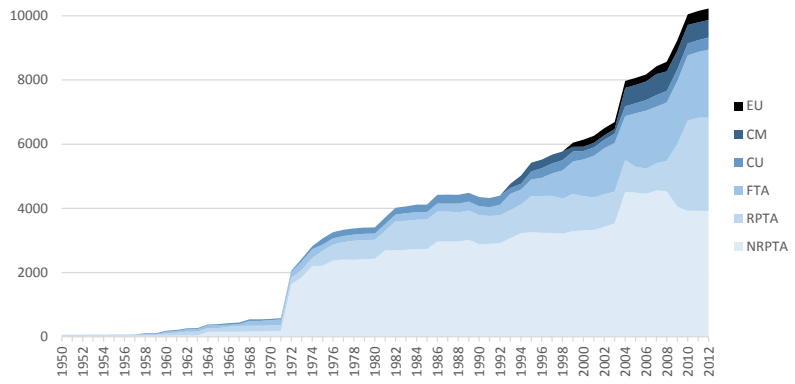
This most recent wave of regionalism covers a much wider network of participants – including bilateral, plurilateral and cross-regional initiatives – and encompasses countries at different levels of economic development – including developed-developed, developing-developing, and developed-developing alliances. And although these new agreements involve preferential tariff reductions, they focus even more on so-called WTO-plus type issues such as services, capital flows, standards, intellectual property, regulatory systems (many of which are non-discriminatory) and commitments on labour and environment issues.

1.3 Stylized facts

So how many trade agreements are in force today? Which countries conclude the most trade agreements? And how long does it take to negotiate a trade agreement? In this section I present some stylized facts on trade agreements.

- **Acceleration of the number of EIAs being concluded since 1990.** As described in the previous section, EIA participation has accelerated over time and become more widespread over time. Not counting NRPTAs, the number of active EIAs increased more or less continuously between 1950 and 1990 (see figure 1.1). Thereafter, EIA activity accelerated noticeably, with the number of EIAs more than doubling over the next five years and more than quadrupling until 2010 to reach close to 300 EIAs presently in force (WTO, 2016). As of 2016, all members of the WTO have at least one active EIA. Today, the only countries without any EIAs are poor islands and North Korea. The other side of this coin is the increase in the number of trade agreements per country. While a big majority of participating countries only had one active EIA in 1980, this share has declined tremendously since the 1990s. This was compensated by a big increase in the number of countries with two to five EIAs, six to ten EIAs and more than ten EIAs.
- **Increase in deepness of integration.** Not only the number of

Figure 1.1: Evolution of trade agreements worldwide by type of agreement.



Note: The number of trade agreements is expressed as the total frequency of trade links by country with an EIA, and then aggregated by type of EIA. There are 193 nations in the database, so there is a maximum of $193 * 193 = 37,249$ trade links.
Source: own calculations based on data from Baier and Bergstrand (2015).

EIAs has increased tremendously in the last three decades, so has the depth of EIAs being concluded. While more than two thirds of EIAs in 1990 were non-reciprocal preferential trade agreements, concluded mainly in the context of the Generalised Scheme of Preferences, today a lion's share of trade agreements are EIAs with a deeper level of integration. In 2010, 44% of all trade agreements notified to the WTO were FTAs, corresponding to more than 20% of all EIA trade links worldwide.

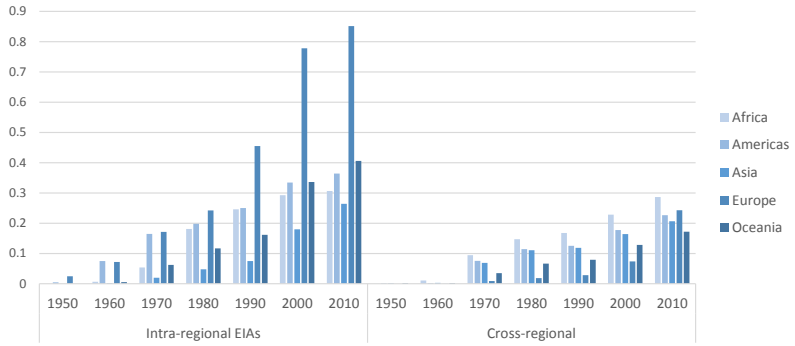
- **Increase in negotiation time.** Given this increase in depth of integration, it comes as no surprise that trade negotiations are becoming increasingly complex. This results in longer negotiation times. While the average negotiations for EIAs signed between the European Union and third countries in the 1990s took slightly longer than two years, this has increased to five years for EIAs signed since 2000. The increase in negotiation time is not only driven by an increase in complexity of the content of EIAs, but also by the politicization of the process and an increase in the number of partners in trade talks. Mölders (2015) investigates negotiation times of FTAs notified to the WTO and concluded worldwide between 1990 and 2011, and finds that trade negotiators need on average 2.30 years and 7.3 rounds to reach an agreement. When there are only two parties at the negotiation table, trade talks progress significantly faster: only 1.80 years are needed to negotiate a bilateral FTA, compared to 2.32 years for FTAs with more than two parties.

- **Geographical scope of EIAs.** A majority of EIAs is concluded between partner countries on the same continent (see figure 1.2). This is especially the case for Europe, where almost 90% of all trade links between European countries were mitigated by a trade agreement, namely the European Union. While Europe is the integration champion when it comes to intra-regional trade agreements, this is not the case for cross-regional trade agreements. Africa spans the crown when it comes to concluding trade agreements with other regions. This can mainly be explained by the colonial ties Africa shares with other continents, and the many non-reciprocal trade agreements concluded between developing and developed countries in the framework of the Generalised Scheme of Preferences. This is confirmed by figure 1.3, which describes the importance of different types of EIAs in terms of trade flows.

1.4 The purpose of trade agreements

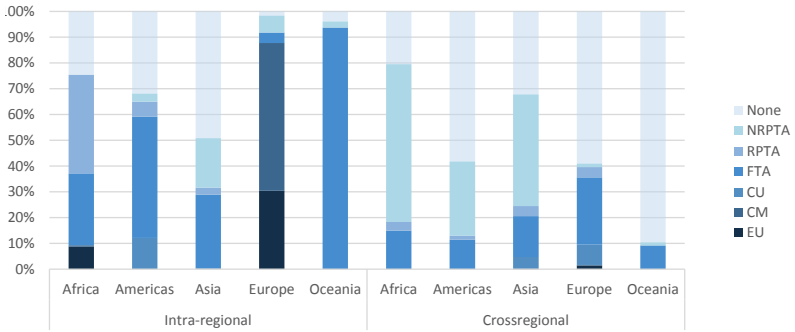
So why do countries decide to form EIAs? What makes trade agreements valuable to the governments concluding the agreement? To answer this

Figure 1.2: Evolution of relative number of trade agreements worldwide by region.



Note: The number of trade agreements is expressed as a percentage, obtained by dividing the number of trade links with an EIA with all possible trade links by country, and then aggregated by region.
Source: own calculations based on data from Baier and Bergstrand (2015).

Figure 1.3: Trade flows by level of integration.



Note: The number of trade agreements is expressed as a percentage, obtained by dividing the number of trade links with an EIA with all possible trade links by country, and then aggregated by region.
Source: own calculations based on data from Baier and Bergstrand (2015) and COMTRADE.

question, I examine which problems trade agreements try to solve. Any theory of trade agreements must identify a means by which the negotiating governments can enjoy mutual gains from the agreement. I take an economic perspective, and identify three classes of problems in the economics literature that trade agreements might try to solve.

Terms-of-trade-driven externality. The oldest and most established strand of the literature explains the value of trade agreements in terms of the terms-of-trade externality. This theory states that governments acting unilaterally will tend to overuse tariffs and other trade restrictions to the extent that they are able to shift the cost of protecting a domestic industry onto foreign producers. This cost-shifting is made possible through lower foreign exporter ("world") prices, thereby improving the terms of trade of the importing nation. While maximizing the domestic governments objective function, this non-cooperative optimal tariff is inefficient from an international point of view as it imposes a negative externality on the trading partners. The purpose of a trade agreement is then to escape from this terms-of-trade-driven prisoner's dilemma by undoing this policy inefficiency and improving the welfare of each government. This is made possible by giving foreign exporting governments a voice in the trade policy choices of their trading partners, so that tariffs can be reduced to internationally efficient levels (Bagwell and Staiger, 2004).

While empirical evidence supporting the terms-of-trade theory of trade agreements is mounting, there is a commonly held view that the motives and behaviors of trade negotiators cannot be understood in terms of economics[6]. Policy makers might not (only) be driven by economic motivations, and hence might not be interested in maximizing national welfare by manipulating the terms of trade. Rather, they might be concerned with the distributional consequences of their tariff choices. They might want to redistribute income to swing voters in the electorate or to groups that offer campaign support (see for example Grossman and Helpman (1994), Grossman and Helpman (1995a), and Grossman and Helpman (1995b), Baldwin (1987) and Helpman (1997). It can be shown, however, that even though including political-economy variables into terms-of-trade models greatly improve the realism of the models, it does not offer any separate purpose for trade agreements (Bagwell and Staiger, 2004). Note also that policymakers in the real world who negotiate trade agreements rarely, if ever, speak of the terms-of-trade consequences of trade policy choices. Rather, they stress how free trade agreements will create new opportunities for exporters by opening up markets. However, this is only an apparent contradiction between economic models and the real world, as an improvement of the

[6]This argument is expressed eloquently by Paul R. Krugman (1997), who argues that if economists ruled the world, there would be no need for trade agreements. This because "global free trade would emerge spontaneously from the unrestricted pursuit of national interest".

terms of trade of the importing country is equivalent to better market access for the exporting country.

Credibility. A second problem trade agreements might solve is when governments are unable to make credible commitments to their own private sector. According to the commitment theory of trade agreements, governments conclude trade agreements as a way to tie their hands against their own lobbies and citizens. There are multiple reasons why governments would want to lock-in policy. First of all, by using trade agreements as a commitment device, governments can make lobbies steer clear from wasting resources or distorting the sectoral allocation of resources. Second, countries could also undertake unilateral liberalizations, but the lock-in effect of making these commitments a part of a trade agreement adds credibility to these commitments. This in turn contributes to providing policy stability, transparency, reliability and reducing uncertainty. The investment-related provisions in trade agreements signed by Central, Eastern and South-Eastern European countries during their transition towards market economies, for example, were mainly intended to achieve this effect (UNCTAD, 2006). Third, trade agreements can serve as commitment devices for future governments. As such, EIAs can for example lower the probability of democracy failure or avoid that future governments overturn decisions (Liu and Ornelas, 2014).

Non-terms-of-trade externalities. Finally, trade agreements can solve negative externalities that go beyond the terms-of-trade externality. I distinguish two additional externalities that arise when I allow for imperfect competition. As to date, however, there is no empirical evidence on the importance of either theories. Therefore I only discuss them briefly. The delocation/profit-shifting theory of trade agreements argues that an additional externality arises because governments use trade protection to delocate firms or shift firm-profits from foreign locations to the domestic market. The offshoring theory of trade agreements argues that offshoring has changed the way international prices are determined. With the rise of offshoring, international prices are increasingly determined by bilateral bargains that are not disciplined by standard market clearing conditions, introducing additional externalities. The presence of either externalities implies an inefficiency from an international perspective. Governments can therefore increase welfare by concluding a trade agreement which will evanesce the externality (Limão, 2016).

While these theories explain *why* countries would want to sign a trade agreement, they do not tell us *with which partner country* they will do it. Baier and Bergstrand (2004) shine some light on the economic determinants of trade agreements. Using a qualitative choice model, they empirically identify five key economic factors influencing the likelihood of pairs of countries to form an FTA in a given year. They find strong evidence

that pairs of countries' governments tend to form FTAs (i) the closer two countries are in distance, (ii) the more remote a pair of continental trading partners is from the rest of the world (ROW), (iii) the larger and more similar in economic size two trading partners are, (iv) the greater the difference of capital-labor ratios between two partners is and (v) the smaller the difference of the members' capital-labor ratios with respect to the ROW's capital-labor ratio. These characteristics predict accurately 85% of the 286 FTAs existing among 1431 country pairs in 1996 for which data were available and 97% of the remaining 1145 country pairs with no FTAs.

1.5 The costs of trade agreements

While trade agreements can lead to welfare improvements for the participating countries, they do not come without any downside - as the many demonstrations and protest actions against the potential EU-USA Transatlantic Trade and Investment Partnership and the EU-Canada Comprehensive Economic and Trade Agreement vehemently show.

I identify three potential sources of costs of trade agreements. I distinguish between costs of trade agreements for the participating countries and costs for third countries.

That EIAs are potentially costly to third countries, is easy to see. By their nature, EIAs are discriminatory. While they improve the market access of the participating countries, this is not the case for third countries, which will see a decrease in their relative competitiveness compared to the participating countries. This can lead to a phenomenon called trade diversion, when trade is diverted from a more efficient exporter towards a less efficient one because of the conclusion of an EIA. This is a strong motivation for countries to participate in EIAs is to counteract the potential negative effects of discrimination and marginalization as other countries conclude them.

Trade agreements do not only have (potentially) negative effects on third countries, but also on the partner countries themselves. In a world with increasing global value chains and more and more overlapping EIAs, trade agreements can entail a negative externality. Jagdish Bhagwati (1995) was the first to point out the complications that arise from the application of different sets of Rules of Origin. The phenomenon has led to paradoxical, and often contradictory outcomes amongst bilateral and multilateral trade partners, as one product can be subject to different tariffs and tariff reduction trajectories, depending on how and where the different parts were produced and assembled. This overlapping and complex worldwide web of Rules of Origin can raise transaction costs for firms to a degree that makes utilization of FTA preferences uneconomical. This so-called "spaghetti bowl effect" becomes especially likely given the low

margins of preference of certain agreements.[7]

Moreover, another potential cost of trade agreements is the loss of a certain degree of policy autonomy. This is especially true for deeper integration agreements, which require more policy coordination and integration of policies on a supra-national level. This might also entail administrative costs on the national level, as policymaking for national governments can become more complex.

Finally, EIAs might entail a cost to the extent that they pose as "stumbling blocs" to global free trade. Some trade experts take a pessimistic view of the latest explosion of EIAs, arguing that there is a link between the surge of bilateral and regional deals and the slow pace of the latest Doha Round of the WTO (Bhagwati, 2008). Others are more optimistic, suggesting the proliferation of bilateral and regional deals will eventually, as in the past, have a domino effect, and force the pace of the Doha negotiations. Still, others argue that there is no correlation or causal link between the pace of multilateralism and regionalism, pointing to the fact that regional initiatives did not take off when the Uruguay Round stalled between 1990 and 1994, and only accelerated after the Round's conclusion in 1994 (Freund, 2000b). In fact, there is evidence that recent regional and multilateral initiatives have actually advanced in tandem. This adds weight to the view that they can, and do, represent complementary aspects of an increasingly complex and sophisticated global trade architecture – one in which bilateral, regional and multilateral agreements coexist and cohere in a kind of "multispeed" system.

1.6 What to expect

As already mentioned, given the importance of EIAs today and in the future in shaping world trade, and increasingly investments, trade in services, public procurement, phytosanitary standards, working conditions, migration and so much more, studying their impact is important[8]. This not only for academics, but also for policymakers and well-informed citizens. This dissertation wants to contribute to this blooming field of literature. Two main research questions will guide this dissertation: (1) What are the

[7] According to Baldwin (2006), the spaghetti bowl effects has two aspects: 1) different rules of origin and/or the exclusions of different lists of sensitive goods can mean that a triangle of three bilateral FTAs between three countries could produce trade that is less than fully free, and 2) bilateral cumulation as opposed to diagonal or full cumulation can distort the purchase pattern of intermediate inputs in a way that does not occur under MFN free trade.

[8] The recent turmoil concerning the negotiations of the Transatlantic Trade and Investment Treaty (TTIP) between the US and the EU have demonstrated this once again very clearly. While there is no shortage of impact assessment studies predicting the effects of TTIP on the economies of the partner countries, the public debate does not seem to believe these numbers. This partly because many studies yield different (and contradicting) results. This underlines the need for precise and correct impact studies of trade agreements. Not only *ex ante*, but also *ex post*.

economic effects of the trade agreements that have been concluded between the EU and the rest of the world? (2) How are trade agreements negotiated?

I start with the *ex post* evaluation of trade agreements. I focus on the trade creation effects of EIAs on the countries concluding them. I adopt several perspectives: I start with a macro-perspective and analyze product-level responses to trade agreements. I then refine the results by taking a micro-perspective and studying the response of firms to trade agreements. I finish by studying the negotiations of trade agreements. In particular, I try to find factors determining the liberalization process of goods in FTAs. This dissertation consists of four main papers, and a more detailed overview of the content of every paper follows in the subsequent paragraphs. The first, third and fourth paper were co-authored with Jan Van Hove, while the second paper was co-authored with Scott L. Baier and Jan Van Hove.

Chapter 2. In this chapter we quantify *ex post* the effects of trade agreements on trade flows between the European Union and the rest of the world. We use a panel on aggregate trade flows between 27 EU countries and 201 third countries and territories for the period of 1988-2013. Following the empirical approach by Baier and Bergstrand (2007), we account for the endogeneity of EIAs by including three sets of fixed effects (importer-time, exporter-time and country pair).

We contribute to the literature by thoroughly disentangling the heterogeneous effects of EIAs. We do this in several different ways. First, we not only look at the effects of EIAs on total trade flows, but we also consider the impact on the intensive and extensive margin. We find that no effects on the total trade flows sometimes hide effects on the intensive and extensive margin. Both margins appear thus to be important for capturing the true trade effects of EIAs.

Second, we allow for differential timing of effects, by including five and ten year lags and calculating average treatment effects. While there are already papers that explore differential timing of EIA effects or the effects of EIAs on the margins, Baier, Bergstrand, and Feng (2014) and Florensa, Márquez-Ramos, and Recalde (2015) and Márquez-Ramos, Florensa, and Recalde (2015) are the only papers so far that allow for differential timing of different types of EIAs, while at the same time looking at the margins, controlling for endogeneity of EIAs and multilateral resistance. Consistent with this literature, we find that medium term reaction effects are important. Longer term effects do not seem to play a substantial role in the European context.

Third, we allow for heterogeneity across EIAs. We start by considering various types of EIAs by including separate dummies for preferential trade agreements (PTAs), free trade agreements (FTAs), and customs unions and common market agreements (CUs). Next, we also look at the trade effect of each EIA separately. We find that most EIAs increase trade flows,

but the magnitude of effects varies strongly across agreements. This is obscured when only looking at a general EIA dummy.

Fourth, we look at the different motivations for concluding EIAs and how this affects trade. Our findings indicate that EIAs that were concluded by the European Union for economic reasons stimulate trade more than EIAs concluded for mixed or political reasons.

Fifth, we estimate the effects of EIAs on trade flows for each EU country individually. We find that the effects for most countries have the same sign. However, there is a lot of variation in the magnitude of effects, with effects not reaching statistical significance for a substantial number of countries.

Finally, we allow for directionality of the effects of EIAs on trade flows, as most EIAs have different stipulations for imports and exports. As expected, we find that EIAs do not have symmetric effects on imports (from the rest of the world into the EU) and exports (from the EU to the rest of the world); while FTAs strongly increase import competition in the EU market, their effect on European exports is much more complex.

Chapter 3. This chapter dives deeper in precisely determining what the impact is of trade agreements. We do this by examining whether trade agreements have anticipation effects. As such, this chapter picks up where chapter two left off: where chapter two only looked at what happens after the entry into force of a trade agreement, this chapter extends the analysis to what happens before entry into force and hence shines a light on the impact EIAs have during their whole lifetime.

We contribute to the literature by looking more closely at the different stages of the lifetime of an EIA and estimating the impact each stage has on trade. We do this by augmenting the gravity model with a dummy for each stage in the lifetime of an EIA. We use the same dataset as used in chapter two, but supplement it with data on every stage in the life of a trade agreement, and control for endogeneity of EIAs and multilateral resistance.

Our results clearly indicate the existence of anticipation effects. These anticipation effects are non-negligible in size. Sometimes they are even more important than the impact on trade flows of trade agreements after they enter into force. It is therefore important to take anticipation effects into account when estimating the total partial equilibrium impact of trade agreements on trade flows.

On average, trade between parties starts increasing from the moment official negotiations start. Trade flows get another boost when the EIA enters into force. Moreover, we find heterogeneous anticipation effects of EIAs on the different Member States of the EU and according to the depth of integration of the EIA, but not according to the pace of the negotiations.

Chapter 4. With firm-level data becoming more widely available in the last couple of years, firm-level analysis has become an invaluable tool for

scholars in international trade. Empirical analysis using information on firm-level export transactions and firm characteristics has unlocked a wealth of information, testing existing models in international trade as well as driving new theoretical models. We continue on this path, pioneered by Roberts and Tybout (1997) and Clerides, Lach, and Tybout (1998), and make a first attempt at determining the impact of trade agreements on firms.

While there is a rich empirical literature on the impact of WTO accessions on firms, this is not the case for bilateral trade liberalizations. There are some papers exploring the impact of a specific trade agreement on firm-level exports - especially NAFTA seems to be a popular subject of study, but to the best of our knowledge, there are no papers estimating a more general effect of a multitude of trade agreements on firm-level exports. This chapter wants to start filling that gap.

We do this by using a rich panel dataset for Belgium on the firm-level for the period 2002-2014. Next to standard gravity variables and data on trade agreements, our dataset comprises of two main sources: the National Bank of Belgium's Trade Database consisting of all Belgian manufacturing exporters and a dataset with firm characteristics such as firm size, age and productivity obtained from the Belgian Business Registry of firms. We can link both datasets together through a common firm identifier, resulting in a very rich panel. This allows us not only to estimate the impact of EIAs on firms, but also to look at the interaction between the impact of EIAs and firm characteristics.

ur analysis proceeds in several steps. We start by estimating a general partial equilibrium effect of trade agreements on firm-level exports, by translating the gravity equation to firm-level exports. We augment the gravity equation with firm characteristics to control for firm heterogeneity, and try different fixed effects structures. We find a positive effect of trade agreements on firm-level trade flows.

We continue our analysis by zooming in on the timing of trade policy effects. We do this by exploring whether trade agreements have effects before they enter into force officially and for how long they keep on stimulating trade after entry into force. We find clear indications that firms anticipate trade agreements: the average firm starts exporting more once FTA negotiations start. Whether or not trade agreements keep stimulating trade up to five years after their official implementation is less clear. Moreover, firms anticipate trade agreements by entering FTA markets ahead of entry into force.

Next, we look at the heterogeneous impact of EIAs on different types of firms. We first include interaction effects of our trade agreement dummy and firm characteristics in our model, and then allow for a non-linear relation between firm characteristics and the effects of a trade agreement by estimating quantile regressions. We find that trade agreements have a homogeneous impact on firm-level exports in terms of firm productivity and

profitability, but a heterogeneous impact in terms of age and firm size. We find that especially firms with 50 to 99 employees tend to take advantage of the opportunities presented by trade agreements, as well as old firms.

Finally, we look at the impact of trade agreements on different margins of trade. We find that the probability of firms starting to export new products to a market is higher when there is a trade agreement with market. This regardless of whether the firm is already active on that market (product diversification) or not (product-market diversification).

Chapter 5. In this last chapter, we take a step back from evaluating the effects of trade policy, and instead look at how these trade policies come about. More in particular, we zoom in on determinants of bilateral tariff negotiation outcomes.

We contribute to the literature, by providing evidence on the practical importance of the terms-of-trade framework as an explanation for the presence of trade agreements. While the terms-of-trade hypothesis is more than a century old, evidence to support or reject the theoretical arguments has long been non-existing. This paper is the first paper to test the augmented terms-of-trade hypothesis in relation to bilateral trade agreements. We do so in a comprehensive manner by combining different factors in the process of trade negotiations.

Our analysis proceeds in two stages. We start by estimating the impact of market power on the probability of a product to be exempted from liberalization in free trade agreements on the one hand, and the speed of liberalization of a product on the other hand. We then extend our baseline model and include variables capturing lobbying efforts and reciprocity in negotiations in our estimations.

Using a novel dataset on 15 recently concluded FTAs, we find support for the terms-of-trade hypothesis. We find that products with higher market power are exempted more often from liberalization and have a slower liberalization path. While economists often assume that most countries are "small", i.e. they do not have market power for any good, our results show that this is not the case. Even small countries have considerable market power for certain products, and manage to exclude these products from liberalization in free trade agreements. Moreover, extending our baseline model and including variables capturing lobbying efforts and reciprocity of trade negotiations, also results in findings that are consistent with the theory. We find that products in import-competing sectors that are politically organized to lobby are excluded from liberalization more often, while we find the opposite for products from exporting sectors that are politically organized. Our results are robust to using different measures of market power and lobbying.

Finally, our findings suggest that countries that are already willing to go further when it comes to opening up trade in terms of free trade of goods, seem to also be more open to including more WTO^{+} and WTO^{X}

provisions. However, our results do not support the idea that countries can include more WTO^{+} and/or WTO^{X} provisions when granting the partner country less liberal tariff conditions.

Chapter 2

Dissecting the trade creation effects of Europe's Economic Integration Agreements

2.1 Introduction

In the past two decades, the number of economic integration agreements notified to the WTO has exploded. In 2016 alone, six new FTAs entered into force[1]. This brings the total number of active trade agreements notified to the WTO to a stunning 432 as of January 1, 2017. All WTO members have signed at least one trade agreement. Though EIAs differ in terms of integration intensity, their popularity signals that they have become the main instrument of current international economic integration.

Not only has the number of EIAs being signed and negotiated exploded in recent years, the economic literature investigating the impact of EIAs has grown equally fast. This has led to tremendous improvements in methodology. While earlier studies report very mixed results on the trade effects of EIAs (see Cipollina and Salvatici (2010) for a comprehensible meta-analysis), recent studies have found more consistent results (see for example Baier and Bergstrand, 2007;Magee, 2008; Kohl, 2014 and Baier, Bergstrand, and Feng, 2014).

Especially the European Union (EU) has been a driving force behind the explosion of EIAs signed and negotiated in recent years. A substantial share of trade between the EU and the rest of the world is currently covered by EIAs, and this share will increase because of ongoing negotiations. Not counting intra-EU trade, 70% of all imports to the EU27 in 2013 and 27% of all EU27 exports were mitigated by EIAs. When we also take into account

[1] rtais.wto.org

trade agreements that had not yet entered into force or that were being negotiated, these numbers go up to 94% for imports and 63% for exports[2].

Despite the EU's active role in international EIAs, surprisingly little is known about the EIAs' overall actual impact on European trade. So, far, the literature has mainly focused on two alternative and related questions: first, the impact of the EU itself on intra-EU trade flows; second, the impact of specific EIAs on European trade. Given the specific characteristics of each bilateral trade relationship, the latter findings cannot be generalized. Therefore, this paper aims to fill this gap in the literature by providing a complete and systematic impact assessment of all recent EU EIAs on European exports and imports.

The two related strands in the literature provide inspiration for this goal. First, studies assessing the trade impact of the EU itself point to substantial trade-creation effects from the gradual process of European integration. Bussière, Fidrmuc, and Schnatz (2008) and Spies and Marques (2009), among others, point to large trade-creation effects from EU enlargements. The introduction of the euro has also enhanced intra-EU trade (see for example Micco, Stein, and Ordoñez (2003); Baldwin, Frankel, and Melitz (2006) and Kelejian, Tavlas, and Petroulas (2012)). However, EU integration also caused trade-diversion effects for the rest of the world Magee, 2008; Geldi, 2012 providing a strong rationale for international trade agreements between the EU and its trading partners.

The second related strand in the literature focuses on the impact of EU EIAs on EU trade. However, these studies are restricted to only an analysis of one or a few specific EIAs. For example, Bensassi, Márquez-Ramos, and Martínez-Zarzoso (2012) study EuroMed trade agreements between certain EU Member States (France, Germany, Italy, and Spain) and four North African countries (Algeria, Egypt, Morocco, and Tunisia) for the period 1995 2008. They find that the FTAs have a positive and significant effect on the exports of the North African countries to their main European partners. Persson and Wilhelmsson (2007) study the impact of EU trade preferences for developing countries, using data on the imports of EU15 countries from developing countries over the period 1960 2002. They find that trade preferences, in general, increase exports from developing countries to the EU15 countries, but this is not the case for all preferential schemes. While the focus of Camarero, Gómez, and Tamarit (2012) is estimating the effect of the euro on the trade of 26 OECD countries, they also provide some evidence on the effects of FTAs between the EU15 and Chile, Iceland, Mexico, Norway, and South Korea. Finally, Lakatos and Nilsson (2015) quantify the impact of the 2011 EU-South Korea Free Trade Agreement on trade flows between the EU and South Korea.

Generally speaking, these specific studies (also called specialist studies in the literature), conclude that EU EIAs increase both imports and exports

[2]Own calculations based on data described in section 2.3.

between the EU and its trading partners. These findings may, however, be driven by the specific features of each bilateral trade relationship or by differences in the applied methodology. Therefore, the quantitative effects of these specialist studies cannot be compared and generalist studies are required if one is interested in the overall effect of EIAs (Kohl 2014). Generalist studies involve the construction of a large dataset with many EIAs to measure their impact on world trade, while specialist studies typically examine the effect of a single agreement. Moreover, these previous studies neglect the probable interaction between trade agreements that can only be taken into account when studying the impact of all EIAs at the same time. The specialist focus on a specific EIA obviously has merit, as it provides an insight into the agreement-specific impact. However, this approach lacks generalizability. Therefore, this paper opts for systematically analyzing the effects of EU EIAs by combining the specialist and generalist approaches. By taking a hybrid approach and combining the methodological strength of generalist studies with the sensitivity to the heterogeneity of specialist studies, we obtain sound results that are specific, yet allow for comparison.

In this paper, we quantify *ex post* the effects of these agreements on trade flows between the European Union and the rest of the world. We use a panel on aggregate trade flows between 27 EU countries[3] and 201 countries and territories that make up the rest of the world for the period of 1988-2013. Following the empirical approach by Baier and Bergstrand (2007), we account for the endogeneity of EIAs by including three sets of fixed effects (importer-time, exporter-time and country pair).

We contribute to the literature by thoroughly disentangling the heterogeneous effects of EIAs. We do this in several different ways. First, we not only look at the effects of EIAs on total trade flows, but we also consider the impact on the intensive and extensive margin. We find that no effects on the total trade flows sometimes hide effects on the intensive and extensive margin. Both margins appear thus to be important for capturing the true trade effects of EIAs.

Second, we allow for differential timing of effects, by including five and ten year lags and calculating average treatment effects. While there are already papers that explore differential timing of EIA effects or the effects of EIAs on the margins, Baier, Bergstrand, and Feng (2014), Florensa, Márquez-Ramos, and Recalde (2015) and Márquez-Ramos, Florensa, and Recalde (2015) are the only papers so far that allow for differential timing of different types of EIAs, while at the same time looking at the margins, controlling for endogeneity of EIAs and multilateral resistance. Consistent with this literature, we find that medium term reaction effects are important. Longer term effects do not seem to play a substantial role in the European context.

[3] We do not include Croatia in our sample, as Croatia became a member of the EU in mid 2013.

Third, we allow for heterogeneity across EIAs. We start by considering various types of EIAs by including separate dummies for preferential trade agreements (PTAs), free trade agreements (FTAs) and customs unions and common market agreements (CUs). Next, we also look at the trade effect of each EIA separately. We find that most EIAs increase trade flows, but the magnitude of effects varies strongly across agreements. This is obscured when only looking at a general EIA dummy.

Fourth, we look at the different motivations for concluding EIAs and how these affect trade. Our findings indicate that the EIAs that were concluded by the EU for economic reasons stimulate trade more than those concluded for political reasons or a mix of political and economic reasons.

Fifth, we estimate the effects of EIAs on trade flows for each EU country individually. We find that the effects for most countries have the same sign. However, there is great variation in the magnitude of the effects, with such effects not being statistically significant for a substantial number of countries.

Finally, we allow for directionality of the effects of EIAs on trade flows. As expected, we find that EIAs do not have symmetric effects on imports and exports; while FTAs strongly increase import competition in the EU market, their effect on European exports is much more complex.

The remainder of this paper is organized as follows. Section 2.2 discusses the gravity model and describes the empirical methodology used while section 2.3 discusses the data. Section 2.4 presents the main results and findings and section 2.5 presents robustness checks dealing with endogeneity and changes over time in pair-specific unobservables. Section 2.6 concludes.

2.2 Methodology

To estimate the effects of trade policy *ex post*, many different techniques have been employed, ranging from single equation regressions to large-scale computable general equilibrium models (Baldwin and Venables, 1995). Most approaches can be classified into two categories: partial equilibrium gravity models and computable general equilibrium models. While both types of methodologies have advantages and drawbacks[4], the literature has "voted with its feet", and gravity models have been the workhorse of the international trade literature for the last 50 years when estimating trade policy effects *ex post* (Head and Mayer, 2014). Computable general

[4]While computable general equilibrium models have the advantage of being able to capture the complicated interplay of effects which may occur after changes in trade policy, they are very sensitive to changes in the calibration of parameters, and face a trade-off between transparency and complexity. This in contrast to gravity models, which use historical data and econometric techniques to estimate partial equilibrium effects of changes in trade policy. However, the latter do not provide direct estimates of welfare costs, as do the former. For comprehensive, yet in-depth discussions of these methodologies, see Baldwin and Venables (1995), Piermartini and Teh (2005) and Ivus and Strong (2007).

equilibrium models, on the other hand, are the main tool to predict the effects of changes in trade policy *ex ante*.

In this paper, we use a panel gravity model with three sets of fixed effects, as proposed by Baier and Bergstrand (2007) and subsequently used by a large number of studies.

The gravity model

Since its introduction by Tinbergen (1962), the gravity model has become the most applied model for analyzing trade flows. In its most simple form, the gravity model states that trade flows between a country pair depend negatively on the distance between the two countries and positively on the mass of each country. Pioneering studies by Tinbergen (1962), Poyhonen (1963), and Linneman (1966) provided initial specifications of the gravity model and estimates of the determinants of trade flows.

During the decades following Tinbergen's seminal work, many authors have come up with theoretical foundations for the gravity equation. Once a theoretical orphan, the gravity model is now a fully-fledged model with strong theoretical micro-foundations. Though estimating the trade elasticity is model-specific and different types of quantitative models (like Armington, Krugman, Ricardian and Melitz models) might yield different structural interpretations of it, Arkolakis, Costinot and Rodriguez-Clarez (2012) argue that the gravity equation offers a common way to estimate the trade elasticity and therefore a common estimator of the gains from trade, despite the different micro-level predictions of different quantitative trade models. They adopt a broad definition of the gravity model and suggest that a trade model satisfies the gravity equation if bilateral trade flows can be decomposed as follows:

$$\ln X_{ijt} = A_{it} + B_{jt} + \gamma \ln \tau_{ijt} + \upsilon_{ijt} \tag{2.1}$$

where $i, j = 1, ..., N$ countries; X_{ijt} denotes bilateral trade flows between country i and country j at time t; A_{it} denotes the characteristics of country i at time t; B_{jt} denotes the characteristics of country j at time t; γ denotes the partial elasticity of bilateral imports with respect to variable trade costs; τ_{ijt} denotes variable trade costs and υ_{ijt} denotes parameters that are country pair-specific but different from variable trade costs.

This general gravity model can easily be extended to accommodate a range of variables in which the researcher might be interested, explaining the popularity of the gravity model. One common extension is the inclusion of a dummy variable when two countries share an EIA, allowing to evaluate the trade effects of EIAs. The gravity equation then takes the following form:

$$\ln X_{ijt} = A_{it} + B_{jt} + \gamma \ln \tau_{ijt} + \zeta EIA_{ijt} + \upsilon'_{ijt} \tag{2.2}$$

with ζ denoting the trade effect of EIAs.

Aitken (1973) was the first to apply the gravity equation to trade agreements to measure the effect of the former on intra-bloc trade. Many followed, with for example Bayoumi and Eichengreen (1997), Frankel (1997), and Soloaga and Winters (2001) extending the model to also take trade diversion effects into account.

Empirical pitfalls of the gravity model

Estimating equation (2) in order to recover ζ might seem fairly simple. There are, however, several econometric problems that have to be addressed when estimating the gravity equation empirically.

First, and for this paper most importantly, the EIA dummy suffers from an endogeneity problem. This potentially biases the gravity model when standard estimation methods are used. Contrary to what is normally assumed in empirical papers, the EIA dummy variable is not an exogenous variable: country pairs that conclude trade agreements are not randomly selected, but unobserved time-invariant bilateral variables influence simultaneously the presence of an EIA and the volume of trade. This endogeneity problem is extremely troublesome, as there does not exist a consensus in the literature as to the direction of the bias. Baier and Bergstrand (2007) find that unobserved heterogeneity biases the coefficients of FTAs *downwards* in standard gravity equation estimations, while Magee (2003) argues that - building on the natural trading partner hypothesis - countries tend to conclude EIAs if they already have significant bilateral trade. This argument is consistent with Roy (2012), who finds that most positive and significant estimates of FTAs can be explained by positive selection of country pairs in trade agreements. The CUs in Roy's study, however, seem to be robust to selection on observables. If any, there is a negative selection effect of CUs.

Even though this endogeneity problem was already raised in 1993 by Trefler, Baier and Bergstrand (2002 and 2004) and Magee (2003) were the first to address it empirically - using instrumental variables with cross section data. However, due to the lack of reliable instruments, these studies have not been very successful in solving the endogeneity of EIAs, providing "at best mixed evidence of isolating the effect of FTAs on trade flows" as Baier and Bergstrand (2007) put it.

Baier and Bergstrand (2007) provide a more convincing solution to the endogeneity problem, using panel data. Panel data are extremely useful in the presence of unobserved time-invariant heterogeneity as it is possible to control for this unobserved heterogeneity and hence alleviate the endogeneity bias by using either country pair fixed effects or differencing the data[5]. Both solutions have since then been extensively used in empirical

[5]Baier and Bergstrand use five year intervals to difference their data, instead of the usual first differences, while Anderson and Yotov (2011) use four year intervals.

work.

Differencing panel data has one major advantage over using fixed effects: if the error terms are highly serially correlated, then estimating the model in differences will be more efficient than fixed effects for large T (Wooldridge, 2010). However, fourth differencing also results in a loss of data as the fourth-differences estimator uses up the first four years of data. This becomes especially problematic when adding lags to our baseline model, as it results in additional loss of data and we only have a time span of 26 years. This is why we will estimate our model using both methods (see section 2.5 for results using differenced data).

Second, A_{it} and B_{jt} include the so-called multilateral price/resistance (MR) term (see for example Anderson and van Wincoop, 2003). There are different methods to estimate this unobserved MR term (see Feenstra 2004). A first option is to proxy the multilateral MR term by price index data (like GDP deflators). However, as not all costs of making transactions across borders are reflected in aggregate price indices, this estimation method will yield biased results.

A second option is to directly estimate the MR term. This requires solving a highly nonlinear system of N equations with a custom nonlinear least squares program. As this is computationally very burdensome, this is not feasible for datasets with a large number of country pairs and years such as ours.

A third alternative is to include country-time fixed effects. Though still computationally burdensome when working with large panel datasets[6], this has become the preferred method of many authors for solving the MR problem (including Baier and Bergstrand 2007).

Third, zero trade flows are very common in trade datasets when a global perspective is adopted. When using a loglinearized gravity equation, these zero observations are ignored, which can potentially bias the results. Two methods have been proposed in the literature to cope with this zero-trade-flow problem: including a selection equation and estimating the model multiplicatively using for example Poisson Pseudo Maximum Likelihood (as proposed by Silva and Tenreyro, 2006). However, due to the particular characteristics and quality of our data set, only 34% of the trade flows in our sample contain zeroes or missing values. Moreover, it is computationally impossible to estimate a model with a large number of fixed effects using PPML because of convergence issues. Finally, Limão (2016) notes that selection due to zero trade flows is not an issue if one is interested only in the impact of EIAs on the treated group, as is the case in this paper, and

This is because trade flows typically change very slowly over time, making it very likely that first differenced data will not display much variation. We will call this fifth and fourth differences, respectively, from now on.

[6]Calculation times have luckily shortened tremendously since the introduction of the high-dimensional fixed effects command *reghdfe* for Stata by Guimaraes and Portugal (2010), which was first used in a gravity setting in Kohl, Brakman, and Garretsen (2016).

believe non-traders will never form an EIA. Evidence from a meta-analysis by Cipollina and Salvatici (2010) indicates no significant differences between estimates that address the zeros issue (Limão, 2016).

This brings us to the following baseline model

$$\ln X_{ijt} = \beta_0 + \beta_1 PTA_{ijt} + \beta_2 FTA_{ijt} + \beta_3 CU_{ijt} + \delta_{it} + \psi_{jt} + \eta_{ij} + \epsilon_{ijt} \quad (2.3)$$

with X_{ijt} bilateral import and export flows from country i to country j at year t, PTA_{ijt} (FTA_{ijt}) (CU_{ijt}) a dummy variable taking the value 1 when countries i and j have an active PTA (FTA) (CU) in year t; δ_{it} importer-time fixed effect; ψ_{jt} exporter-time fixed effect; η_{ij} country pair fixed effect and ϵ_{ijt} error term. Note that terms A_{it} and B_{jt} of equation 2.2 – which typically include standard gravity variables such as the log of GDP and a dummy variable for sharing contiguous borders, a common language or colonial ties – are completely absorbed by our importer-time and exporter-time fixed effects.

Dissecting the effects of EIAs

Our properly specified baseline model is, however, too simple to capture the complex trade effects of EIAs. Starting from our simple baseline model, we will therefore progressively dissect the heterogeneous effects of the European Union EIAs in a more precise manner. We hence let go of the frequently used empirical assumption of homogeneous trade effects of EIAs (see for example Rose 2000; Feenstra, Markusen and Rose 2001 and Frankel and Rose 2002). In this paper, we dissect the complexity of the effects of EIAs in six ways.

First of all, we are interested in the exact way trade agreements affect trade flows: do EIAs affect how much countries trade of a given good (the intensive margin) or rather how many goods are traded (the extensive margin)? Following Hummels and Klenow (2005), we will therefore decompose our trade flows into an intensive and an extensive margin, using highly disaggregated data.

Hummels and Klenow (2005) define the intensive margin of goods exported from country i to j in year t as the market share of country i in country j's imports from the world within the set of products that i exports to j:

$$IM_{ijt} = \frac{\sum_{p \in P_{ijt}} X^p_{ijt}}{\sum_{p \in P_{ijt}} X^p_{Wjt}} \quad (2.4)$$

where X^p_{ijt} is the value of exports from i to j for product p in year t, X^p_{Wjt} the value of country j's imports from the world for product p and P_{ijt} the set of all products exported from i to j in year t.

The extensive margin of goods exported is defined as the fraction of all products that are exported from i to j, where each product is weighted by the importance of that product in world exports to j in year t:

$$EM_{ijt} = \frac{\sum_{p \in P_{ijt}} X^p_{Wjt}}{\sum_{p \in P_{Wjt}} X^p_{Wjt}} \tag{2.5}$$

with P_{Wjt} the set of all products exported by the world to j in year t.

A nice property of the Hummels and Klenow (2005) decomposition is that the product of the margins equals the ratio of exorts from i to j relative to country j's total imports. Taking the natural logs and using some algebra, Hummels and Klenow show that the log of the value of the trade flow from i to j can be decomposed linearly into the log of the extensive margin, the log of the intensive margin and the value of imports from the world into country j:

$$lnX_{ijt} = lnEM_{ijt} + lnIM_{ijt} + lnX_{jt} \tag{2.6}$$

Note that the term lnX_{jt} will be absorbed by our importer-time fixed effect δ_{it} in our estimations.

Second, EIAs could also have very different effects depending on how long they have already been in place. EIAs are typically phased in over a period of five to ten years[7], and terms-of-trade changes take typically a few years before coming into effect, altering the effect of EIAs over time. Following Baier and Bergstrand (2007) and Baier, Bergstrand, and Feng (2014), we estimate a distributed lags model by including five and ten year lags of our set of EIA variables in our estimation to pick up on these reaction effects.

Our fixed effects specification then becomes

$$\begin{aligned} \ln X_{ijt} = \beta_0 + \beta_1 PTA_{ijt} + \beta_2 PTA_{ijt-5} + \beta_3 PTA_{ijt-10} + \\ \beta_4 FTA_{ijt} + \beta_5 FTA_{ijt-5} + \beta_6 FTA_{ijt-10} + \beta_7 CU_{ijt} + \beta_8 CU_{ijt-5} + \\ \beta_9 CU_{ijt-10} + \delta_{it} + \psi_{jt} + \eta_{ij} + \epsilon_{ijt} \end{aligned} \tag{2.7}$$

Magee (2008) goes a step further, and includes a separate dummy per year that an EIA has entered into force. This makes it possible to evaluate how the effects of EIAs change over time. However, including this many dummy variables in our model results in unstable coefficients due to multicollinearity. Trade flows typically display some hysterisis over time, making several of these variables highly correlated.

Third, we take the dissection of the European EIAs even further and look at the effects of each TWPTA, FTA and CU individually. We do this by swapping the PTA, FTA and CU dummies with a separate dummy for each agreement (the agreements included are listed in table 2.7 in the appendix).

[7] Dür et al. (2014) coded 587 agreements signed between 1945 and 2009 and find that it takes on average 5.7 years for the tariff cuts of an FTA to be fully implemented and 4.5 years for a CU. Partial trade agreements have a relatively short so-called "transition period" of just 1.7 years.

Fourth, and pushing the dissecting of the EIAs even further, we look at the impact of different motivations for concluding trade agreements on trade flows. We do this by re-categorizing our EIA dummies and adding them into our baseline model.

Fifth, we have a closer look at the effects of the EU EIAs on each EU country individually. EU EIAs are negotiated by the European Union, but need not have a similar impact on all Member States. The 27 economies of the European Union differ considerably and EIAs can have very different economic effects, depending on the characteristics of the signatories. We will therefore estimate our baseline model for the EU countries individually.

Following Herderschee and Qiao (2007), we do this by creating three sets of interaction terms with on the one hand our EIA dummies and on the other hand a dummy for the country for which we estimate the individual effect. Our fixed effects specification then becomes

$$\ln X_{ijt} = \beta_0 + \beta_1 PTA_{ijt} * I_j + \beta_2 FTA_{ijt} * I_j + \beta_3 CU_{ijt} * I_j + \delta_{it} + \psi_{jt} + \eta_{ij} + \epsilon_{ijt} \quad (2.8)$$

with I_j an indicator variable for country j.

Finally we look at the directionality of effects. Most papers looking at the effects of EIAs - including Baier, Bergstrand & Feng (2014) and Kohl (2014) - assume implicitly that the effects of EIAs on imports and exports are symmetric. In this paper, we will allow for EIAs to have different effects on import and export flows. We will do this by interacting our EIA dummies with a dummy variable indicating whether the 27 EU countries are trading with other EU countries, importing from non-EU27 countries or exporting to non-EU27 countries. Note that we use our full sample of observations in all regressions.

2.3 Data

The data used in this paper cover bilateral export and import flows between the 27 Member States of the European Union and the rest of the world (201 countries and territories) from 1988 through 2013. Table 2.1 lists the countries included in our dataset.

We have two main datasets. Data on bilateral export and import flows come from the Eurostat database COMEXT. We opted for this database as it contains the most detailed and complete information on trade between each European Union country and the rest of the world: both intra- and extra-EU imports and exports are available on the eight-digit level from 1988 to 2013 for a large number of countries[8]. Note that data on import

[8]The COMEXT database considers Belgium and Luxembourg, and Liechtenstein and Switzerland as one country. So when we refer to Belgium or Switzerland in this paper, we really mean Belgium and Luxembourg, and Switzerland and Liechtenstein.

Table 2.1: List of countries in dataset

Afghanistan, Albania, Algeria, American Samoa, Andorra, Angola, Anguilla, Antarctica, Antigua Barbuda, Argentina, Armenia, Aruba, Australia, Austria, Azerbaijan, Bahamas, Bahrain, Bangladesh, Barbados, Belarus, Belgium, Belize, Benin, Bermuda, Bhutan, Bolivia, Bosnia Herzegovina, Botswana, Bouvet Isl., Brazil, British Indian OT, British Virgin Isl., Brunei Darussalam, Bulgaria, Burkina Faso, Burundi, Cabo Verde, Cambodia, Cameroon, Canada, Cayman Isl., Central African Rep., Chad, Chile, China, Christmas Isl., Cocos Isl., Colombia, Comoros, Congo, Cook Isl., Costa Rica, Cote d'Ivoire, Cuba, Cyprus, Czech Rep., Denmark, Djibouti, Dominica, Dominican Rep., DR Congo, Ecuador, Egypt, El Salvador, Equatorial Guinea, Eritrea, Estonia, Ethiopia, Falkland Isl., Faroe Isl., Fiji, Finland, France, French Polynesia, French ST, Gabon, Gambia, Georgia, Germany, Ghana, Greece, Greenland, Grenada, Guam, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Heard and McDonald Isl., Holy See (Vatican), Honduras, Hong Kong, Hungary, Iceland, India, Indonesia, Iran, Iraq, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Kiribati, Korea, Kuwait, Kyrgyzstan, Laos, Latvia, Lebanon, Lesotho, Liberia, Libya, Lithuania, Macao, Macedonia, Madagascar, Malawi, Malaysia, Maldives, Mali, Malta, Marshall Isl., Mauritania, Mauritius, Mexico, Micronesia, Moldova, Mongolia, Montenegro, Montserrat, Morocco, Mozambique, Myanmar, Namibia, Nauru, Nepal, Netherland Antilles, Netherlands, New Caledonia, New Zealand, Nicaragua, Niger, Nigeria, Niue, Norfolk Isl., Northern Mariana Isl., North-Korea, Norway, Oman, Pakistan, Palau, Palestine, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Pitcairn, Poland, Portugal, Qatar, Romania, Russia, Rwanda, Samoa, San Marino, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia, Seychelles, Sierra Leone, Singapore, Slovakia, Slovenia, Solomon Isl., Somalia, South Georgia & Sandwich Isl., South-Africa, Spain, Sri Lanka, St Helena, Ascension & Tristan, St Kitts & Nevis, St Lucia, St Pierre & Miquelon, St Vincent & Grenadines, Sudan, Suriname, Swaziland, Sweden, Switzerland, Syria, Taiwan, Tajikistan, Tanzania, Thailand, Timor-Leste, Togo, Tokelau, Tonga, Trinidad & Tobago, Tunisia, Turkey, Turkmenistan, Turks & Caicos Isl., Tuvalu, UAE, Uganda, UK, Ukraine, United States Minor OI, Uruguay, US Virgin Isl., USA, Uzbekistan, Vanuatu, Venezuela, Vietnam, Wallis & Futuna, Yemen, Zimbabwe, Zambia

flows are typically considered to be more reliable than data on exports, as the former are often reported in more detail, so to allow customs to apply duties, taxes or other regulatory controls. WTO (2012) notes that there are some exceptions to this rule of thumb: export data can be more reliable when trade takes place within a customs area and when exporters have a strong incentive to draw-back internal taxes (i.e. to receive a rebate on taxes or duty paid for imported goods which are subsequently exported in the same form or a different form). Moreover, Eurostat (2017) notes that while discrepancies between imports and mirrored exports might arise for a number of methodological reasons, these disappear at a more aggregate level.

For our dataset on trade agreements, we constructed a multichotomous index of EIAs. We used the same EIA classification as Baier and Bergstrand (based upon Frankel 1997 and Balassa 1987), but since the European Union did not conclude any economic union agreements and because of the small number of two-way preferential trade agreements, we compiled the Baier and Bergstrand index into three categories: (1) one-way and two-way preferential trade agreement (PTA), (2) free trade agreement (FTA) and (3) customs union and common market (CU). Data on FTAs and CUs were collected from McGill (2014), Tuck (2014), WorldTradeLaw.net (2013), WTO (2014), EFTA (2014) and European European Commission (2014)[9].

[9]When data on entry into force of agreements exceptionally differed between sources, we used the data provided by the European Commission. Comparing our EIA data to

Table 2.7 in the appendix lists all the European Union free trade agreements and customs unions with the rest of the world. For data on PTAs, we used Regulations of the EU Council concerning GSP schemes (1987; 1988; 1994; 1998; 2001; 2005; 2008; 2012) and European European Commission (2014) as our main sources. Summary statistics on EIAs are provided in table 2.2.

Table 2.2: Summary statistics on EIAs.

Agreement	Frequency	Percentage	Share of EIAs
No EIA	80 515	44%	
OPTA	57 259	31%	56%
TWPTA	6 763	4%	7%
FTA	24 778	14%	24%
CU	12 999	7%	13%
Total	182 314	100%	

2.4 Main results

Baseline model

Table 2.3 represents estimates of the partial equilibrium effects of different types of EIAs on trade flows (i.e. import and export flows), based on equation (2.3). As the Breusch-Pagan test and the Wooldrigde test indicate the presence of severe heteroskedasticity and serial correlation in the data, respectively, we employ standard errors that are clustered two-way, namely by country pair and year.

First of all, note that the European Union has only three customs unions with the rest of the world (Andorra, Turkey and San Marino) and three common market agreements (Liechtenstein[10], Norway and Iceland). Results for the CU dummies will therefore mainly be driven by Turkey, Norway and Iceland, and will have large standard errors due to the small sample size.

From the first column of table 2.3, we find that deeper integration agreements have larger effects on trade flows. This is consistent with Baier, Bergstrand, and Feng (2014), who also find that FTAs and CUs have larger average effects on trade flows than PTAs, and CUs have larger effects on trade than FTAs and PTAs.

We find that PTAs do not have a statistically or economically significant impact on trade flows. This is surprising, as the goal of most EU PTAs is

the EIA data collected by Baier and Bergstrand (and available at `www.nd.edu/~jbergstr`) reveals a high intercoder reliability: we obtain 91% agreement between both datasets and a Krippendorph's Alpha of .85.

[10]We ignore the common market agreement between Liechtenstein and the EU, as Liechtenstein and Switzerland are considered one country in our dataset.

Table 2.3: GLS estimation of the baseline model using 3 sets of fixed effects.

	(1)			(2)			(3)		
	X	IM	EM	X	IM	EM	X	IM	EM
PTA	0.02	-0.18***	0.20***	0.01	-0.18**	0.19***	0.07	-0.15*	0.21***
	(0.050)	(0.067)	(0.056)	(0.050)	(0.070)	(0.058)	(0.053)	(0.071)	(0.070)
Lag5				0.08**	-0.03	0.12***	0.08*	-0.04	0.12***
				(0.040)	(0.044)	(0.034)	(0.042)	(0.045)	(0.037)
Lag10							0.06	-0.01	0.07
							(0.043)	(0.048)	(0.041)
FTA	0.20**	-0.11	0.31***	0.20**	-0.10	0.30***	0.23**	-0.05	0.28***
	(0.079)	(0.087)	(0.082)	(0.075)	(0.088)	(0.082)	(0.089)	(0.095)	(0.092)
Lag5				0.09	-0.09	0.17***	0.10*	-0.08	0.18***
				(0.053)	(0.051)	(0.045)	(0.056)	(0.061)	(0.050)
Lag10							0.02	-0.02	0.04
							(0.043)	(0.053)	(0.050)
CU	0.49***	-0.10	0.59***	0.45***	-0.09	0.54***	0.46***	-0.08	0.54***
	(0.119)	(0.096)	(0.116)	(0.112)	(0.094)	(0.118)	(0.121)	(0.103)	(0.136)
Lag5				0.16*	-0.04	0.20**	0.19**	-0.03	0.22**
				(0.080)	(0.068)	(0.071)	(0.083)	(0.082)	(0.077)
Lag10							-0.08	-0.07	-0.02
							(0.071)	(0.078)	(0.077)
Total ATE									
PTA							0.19**	-0.20**	0.40***
							(0.078)	(0.091)	(0.090)
FTA							0.35**	-0.15	0.50***
							(0.132)	(0.140)	(0.124)
CU							0.57***	-0.17	0.74***
							(0.188)	(0.154)	(0.143)
Observations	182,314	182,314	182,314	162,976	162,976	162,976	134,031	134,031	134,031

Estimation includes importer-year, exporter-year and pair fixed effects. Standard errors clustered on country pair and year in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Total average treatment effects (ATEs) are computed using a two-tailed joint significance test.

to increase imports from (poor) extra-EU countries to the EU. However, there is some evidence that exports eligible for preferential treatment do not always enter the EU market at a preferential rate, due to for example complex rules of origin procedures (see for example Manchin (2006) for a discussion of the preference utilisation rate of ACP countries). This unexploited potential of PTAs might explain why they have not succeeded in significantly raising imports to the EU.

We find a differential result based on the estimates for FTAs and CUs. These trade agreements have a statistically significant impact on total trade flows, increasing them on average with $100 * (e^{0.20} - 1) = 22\%$ and 63% respectively.

Key role for the extensive margin

Each set in table 2.3 presents the results of running the same specification with three alternative dependent variables: bilateral import or export flows (X or ln X_{ijt} in equation (2.3)), the intensive margin (IM or lnIM_{ijt}) and the extensive margin (EM or lnEM_{ijt}).

We find that the extensive margin plays an important role for all three

types of EIAs. Even though we did not find any effect of PTAs on total trade flows, we do find that PTAs have a positive and statistically significant effect on the extensive margin and increase the variety of goods traded. This trade diversification effect is, however, offset by an equally large but negative effect on the intensive margin: we find that the volume traded but per good decreases.

For FTAs and CUs we also find an increase in the extensive margin. This increase is however not offset by intensive margin effects, resulting in positive total trade flow effects. We elaborate further on the on the margins of trade and differential timing of EIAs in the next section.

Differential timing of EIAs

In column (2) and (3) of table 2.3, we added five and ten year lags to the specifications[11]. We find that trade agreements continue having effects on trade flows up to five years after the EIA has entered into force. As mentioned before, this is because of two reasons. First, it takes time for the terms of trade to adjust to the new situation. Second, many stipulations of trade agreements only enter into force after a certain period of time, since EIAs are typically phased-in over a time period of up to five years or sometimes even ten or more years[12].

In contrast to Baier, Bergstrand, and Feng (2014), we do not find any effect of EIAs up to ten years. This suggests that the average onset of effects of EIAs with a European partner is faster than the average EIA.

Taking a closer look, we see that PTAs do not have a contemporaneous effect on trade flows, but they do have a small positive effect (+8%) in the medium run. FTAs increase total trade flows on average with 11% after five years, while CUs increase them on average with 21%.

Looking at the margins, we find that these lagged effects are completely driven by changes in the relative number of goods traded. In contrast to Baier, Bergstrand, and Feng (2014), we do not find that intensive margin effects of EIAs precede extensive margin effects. Our findings also contradict the theoretical work of Ruhl (2008) and Arkolakis, Eaton and Kortum (2012) who argue that effects on the extensive margin are delayed due to fixed export costs and delayed consumer responses respectively. This again points in the direction of EU EIAs having very fast effects on trade flows.

[11] Note that when adding five and ten year lags, only agreements enforced by respectively 2008 and 2003 are considered.

[12] However, it is not clear yet whether and how these phase-in periods affect trade. Pioneering work by Besedeš, Kohl, and Lake (2015), using data on the phase-in schedules for all products in the North American FTA (NAFTA), shows that US imports of products with phased in cuts grew at statistically similar rates as imports of products which experienced an immediate cut in tariff rates. Evidence for other trade agreements is not available yet, due to the large data collection required for the analysis.

In order to see the cumulative effects of EIAs over time, we calculated total average treatment effects (ATEs) using a two-tailed joint significance test[13]. We find that PTAs have a small, but positive and statistically significant effect on trade flows over time (+21%), while FTAs and CUs have moderate (+42%) and large effects (+77%), respectively, in the long run.

Effects of individual EIAs

We now look at the different European Union EIAs separately. How does each FTA and CU influence trade flows between the 27 EU countries and the rest of the world? For this, we swap the FTA and CU dummy in equation (2.3) for a separate dummy for each agreement[14].

Results are summarized in figure 2.1. The full regression output can be found in table 2.9 in the appendix. Consistent with our baseline results, we find that most trade agreements have a positive effect on total trade flows. A majority of trade agreements in our sample (11 or 55%) increase contemporaneous trade flows, while 8 (40%) do not have any statistically significant effect and one EIA - namely the FTA with Albania - has decreased total trade flows.

Looking at the margins, we find again that the extensive margins dominates. For most EIAs we find that the increase in trade flows is driven by an expansion of the relative amount of goods traded, and not by an increase in the volume of goods traded. The only exceptions are Tunisia and Morocco, where we find positive effects on the intensive margin and a small negative effect on the extensive margin.

Motivation matters

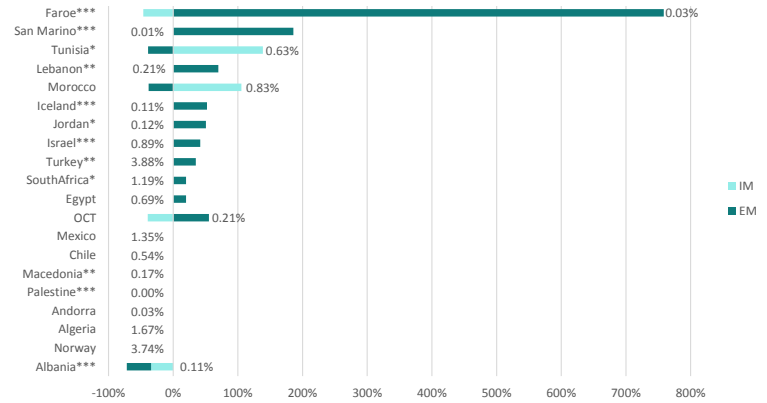
Since the start of the EU, EU trade policy has differentiated between different groups of countries, granting them different preferences. The classification of the many different types of EU EIAs into only three categories is therefore rather crude. Persson and Wilhemsson (2007)[15] use the notion of "pyramid of privilege" to study different European PTA

[13] This in contrast to Baier, Bergstrand, and Feng (2014) who simply take the sum of the coefficients that are statistically significant.

[14] Note that we cannot estimate the individual effects of the agreements with Papua, CARIFORUM, Cameroon, Mauritius, Seychelles, Madagascar, Zimbabwe, Botswana, Lesotho, Swaziland, Mozambique, Montenegro, Bosnia and Herzegovina, Serbia Switzerland, South Korea, Colombia, Peru, Honduras, Panama, Nicaragua, Costa Rica and El Salvador because of collinearity. Most of these agreements only entered into force in the last year(s) of our sample, or are concluded with countries that have poor data availability. Therefore we group them together in a control variable. This control variable also absorbs all other EIAs that are not captured by the separate agreement dummies (namely PTAs and EIAs that were in place between the rest of the world and EU countries, before they were part of the European Union).

[15] We thank an anonymous referee for this suggestion.

Figure 2.1: Contemporaneous effects (in %) of individual EIAs using a GLS estimation with fixed effects.



Note: The percentage next to each bar indicates the share of each country in total extra-EU trade for 2013. The stars next to the agreements indicate statistical significance of the estimate for the total trade flow (*** p<0.01, ** p<0.05, * p<0.1). Only estimates for the margins which are statistically significant at the 10% treshold are shown in the graph. The full regression output can be found in table 2.9 in the appendix. Note that we use contemporaneous effects, as computing total ATEs with five and ten year lags would mean that we could only look at EIAs enforced by 2003.

schemes and the "privileges" or trade benefits they offer. We extend this framework to EIAs with a deeper level of integration, and also include FTAs and CUs. Moreover, we not only look at the degree of market access offered by each EIA subtype, but also look at the motivation for concluding trade agreements as the EU has many different motives for undertaking EIAs, some of which are more economically inspired, while others are more politically inspired (see Woolcocke (2007), for a discussion of the different EU motivations).

We distinguish between the following subtypes of EIAs (European Commission 2014). The Generalised Scheme of Preferences (GSP) is a one-way PTA system allowing developing country exporters to pay less or no duties on their exports to the EU. The goal is to contribute to their economic growth by granting these countries access to EU markets. From an EU perspective, these agreements are not concluded to help EU firms gain more market acces, and hence they are not expected to stimulate EU exports. We therefore consider the motivation for concluding these agreements from the perspective of the EU as political. The Everything but Arms (EBA) arrangement is similar, but only for least developed countries. It is more encompassing, as it grants duty-free quota-free access on all products except for arms and ammunition. Economic Partnership Agreements (EPA) and

Cooperation Agreements (CA) are both TWPTAs and grant more or at least as much privileges as the GSP and EBA schemes.

Stabilisation and Association Agreements (SAA) were concluded to establish a progressive partnership with Western Balkan countries aiming to stabilise the region, establish a free-trade area and eventually EU membership. The motivation for these agreements is hence mainly political. Association Agreements (ASS) are agreements setting up an all-embracing framework to conduct bilateral relations, close political and economic cooperation as well as human rights and democratic principles. Free trade agreements are a core component of this. "Free Trade Agreements" (EUFTA)[16] are economic EIAs, concluded with the purpose of increasing market access and stimulating trade. Deep and Comprehensive FTAs (DCFTA) or so-called "new generation" FTAs are more ambitious than EUFTAs in lifting trade barriers. Finally, there are European Economic Area Agreements and Customs Unions (EUCU), which are formed for economic, as well as political, reasons and they grant their beneficiaries very extensive market access.

To sum up, the GSP, EBA, TWPTA and SAA agreements are all concluded mainly for political reasons, while the main motivation for the Eureopean Union to conclude EUFTAs, DCFTAs and CUs is economic. ASS are concluded for both economic and political reasons. GSP, EBA, TWPTA and SAA enjoy low degrees of privilege, while ASS, EUFTA, DCFTA and CU enjoy higher degrees of market access.

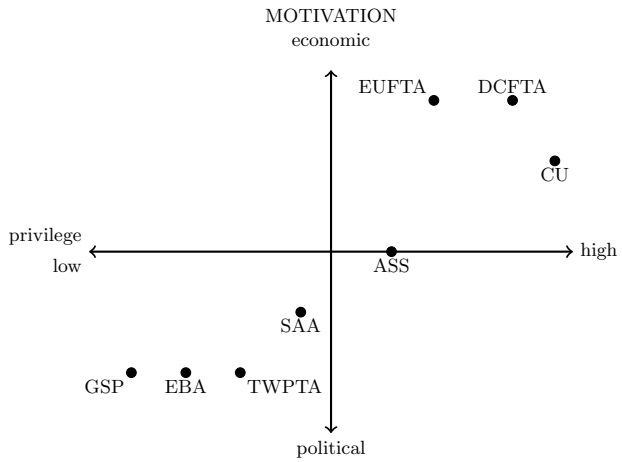
Table 2.7 in the appendix lists all agreements and their respective subtype. Plotting these agreements according to their market access and the motivation of the EU for concluding them - based on Persson and Wilhelmsson (2007) and the descriptions of the different types of agreements outlined in the previous paragraphs - results in figure 2.2. Note that - unsurprisingly - there exists a strong and positive relationship between motivation and privilege.

In order to check if this distinction also affects the data, we rerun our baseline model, but now include a dummy for each of these agreements instead of the PTA, FTA and CU dummies in equation (2.3). We also include a control variable that absorbs all EIAs that are not captured by these dummies. Note that most EPAs entered into force after 2009 and there are only a small number of CAs. This is why we will merge both of these subtypes into one category called TWPTA. Moreover, the first DCFTA was concluded with South Korea and entered into force only in 2011. Hence, we will collapse both EUFTAs and DCFTAs into one category.

Our results are outlined in table 2.4. We find that motivation for concluding EIAs matters. Looking at the contemporaneous effects, we see

[16] In order to distinguish between what the EU calls "Free trade agreements", and the more general class of FTAs, we will call the former EUFTAs from now on.

Figure 2.2: Classification of EU EIAs according to degree of market access (privilege) and motivation of the EU for concluding the EIA.



Note: see text for a description of the different types of agreements. Classification is based on Persson and Wilhelmsson (2007) and European Commission (2014).

that GSP, EBA, TWPTA and SAA do not have any effect on total trade flows, while ASS, EUFTA and EUCU increase trade flows on average with respectively 35%, 105% and 35%. Thus, EIAs adopted for only economic reasons double trade flows, while EIAs adopted for both political and economic reasons also increase trade, but to a lesser extent. EIAs made for political reasons do not seem to have an impact on total trade flows.

This increase is entirely caused by an increase in the intensive margin for ASS, while for EUFTA and EUCU it is completely driven by the extensive margin. Regarding GSP and EBA, we find positive effects on the extensive margin. This is completely offset by negative effects on the intensive margin, resulting in a zero effect on total trade flows. Thus, GSP and EBA result in increasing export diversification, but they do not manage to increase total revenues from trade. We find no effects on the margins for TWPTAs.

In terms of lags, we find positive effects up to ten years for GSP, as well as EBA, arrangements. This is driven by an increase in the extensive margin in the medium term. TWPTAs have no lagged effects.

For the ASS, EUFTA and EUCU we find positive and statistically significant effects up to five years. This is again driven by the extensive margin. For EUFTAs, we find small negative effects on total trade flows after ten year (-21%), suggesting overshooting of the initial response to these trade agreements.

Table 2.4: GLS estimation of the impact of motivation and degree of privilege of EIAs using 3 sets of fixed effects.

	(1)			(2)			(3)		
	X	**IM**	**EM**	**X**	**IM**	**EM**	**X**	**IM**	**EM**
GSP	0.05	-0.19**	0.25***	0.03	-0.20**	0.23***	0.08	-0.10	0.18**
	(0.052)	(0.074)	(0.066)	(0.055)	(0.075)	(0.063)	(0.060)	(0.073)	(0.064)
Lag5				0.12**	-0.02	0.14***	0.12**	-0.06	0.18***
				(0.048)	(0.050)	(0.032)	(0.046)	(0.048)	(0.036)
Lag10							0.13**	0.13*	-0.00
							(0.058)	(0.067)	(0.053)
EBA	-0.12	-0.39***	0.27**	-0.14	-0.38**	0.24**	-0.01	-0.27**	0.26**
	(0.080)	(0.130)	(0.101)	(0.084)	(0.133)	(0.093)	(0.080)	(0.122)	(0.115)
Lag5				0.13*	-0.10	0.23***	0.13**	-0.13	0.26***
				(0.064)	(0.077)	(0.053)	(0.060)	(0.080)	(0.061)
Lag10							0.24**	0.13	0.11
							(0.087)	(0.084)	(0.074)
TWPTA	0.01	-0.00	0.01	-0.05	-0.06	0.01	0.03	0.02	0.01
	(0.137)	(0.130)	(0.106)	(0.131)	(0.124)	(0.113)	(0.146)	(0.134)	(0.141)
Lag5				0.18	0.11	0.06	0.21	0.11	0.10
				(0.108)	(0.085)	(0.080)	(0.126)	(0.109)	(0.094)
Lag10							0.04	0.04	-0.00
							(0.088)	(0.097)	(0.084)
SAA	-0.04	-0.31	0.27***	-0.10	-0.39	0.28**	-0.08	-0.38	0.30**
	(0.327)	(0.327)	(0.098)	(0.332)	(0.334)	(0.112)	(0.324)	(0.327)	(0.122)
Lag5				-0.19	-0.36**	0.17	-0.22	-0.40**	0.18
				(0.180)	(0.147)	(0.114)	(0.193)	(0.159)	(0.109)
ASS	0.30***	0.32***	-0.02	0.32***	0.33***	-0.01	0.27**	0.22**	0.05
	(0.100)	(0.094)	(0.071)	(0.103)	(0.096)	(0.076)	(0.120)	(0.092)	(0.073)
Lag5				0.18**	0.02	0.16***	0.17*	-0.01	0.18***
				(0.078)	(0.079)	(0.055)	(0.091)	(0.088)	(0.061)
Lag10							-0.01	-0.11	0.09
							(0.112)	(0.115)	(0.082)
EUFTA	0.72***	-0.29	1.01***	0.71***	-0.29	1.01***	0.73***	-0.13	0.87***
	(0.210)	(0.193)	(0.280)	(0.204)	(0.190)	(0.262)	(0.212)	(0.145)	(0.194)
Lag5				0.17*	-0.20**	0.37***	0.24**	-0.19	0.43***
				(0.090)	(0.086)	(0.111)	(0.102)	(0.110)	(0.129)
Lag10							-0.23**	-0.06	-0.17
							(0.094)	(0.119)	(0.131)
EUCU	0.30***	-0.14	0.44***	0.24**	-0.12	0.37***	0.28**	-0.06	0.33**
	(0.101)	(0.107)	(0.118)	(0.101)	(0.110)	(0.126)	(0.125)	(0.115)	(0.149)
Lag5				0.22***	-0.04	0.26***	0.22**	-0.01	0.24***
				(0.072)	(0.072)	(0.077)	(0.078)	(0.080)	(0.079)
Lag10							-0.12	0.05	-0.17
							(0.118)	(0.130)	(0.148)
control	0.02	-0.15*	0.17**	0.01	-0.15*	0.16**	0.06	-0.12	0.18**
	(0.063)	(0.080)	(0.062)	(0.062)	(0.081)	(0.066)	(0.074)	(0.094)	(0.083)
Lag5				0.07*	-0.07	0.15***	0.06	-0.06	0.13***
				(0.042)	(0.043)	(0.034)	(0.045)	(0.049)	(0.037)
Lag10							0.07*	-0.03	0.10**
							(0.037)	(0.031)	(0.038)
Observations	182,314	182,314	182,314	162,976	162,976	162,976	134,031	134,031	134,031

Estimation includes importer-year, exporter-year and pair fixed effects. Standard errors clustered on country pair and year in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Because most SAAs only entered into force recently, lag 10 is omitted. Other captures all EIAs not captured by the GSP, EBA, TWPTA, SAA, ASS, EUFTA and EUCU dummies. For a list of agreements per category, see table 2.7 in the appendix.

Effects of EIAs on individual countries

Now we relax the assumption that trade agreements have a homogeneous impact on the countries that sign them and estimate the effects of PTAs, FTAs and CUs on each EU27 country separately. EIAs with EU countries are negotiated by the European Union, but will most likely not have a similar impact on all Member States. The 27 economies of the European Union differ considerably in terms of GDP, distance to extra-EU countries, sharing a common language with extra-EU countries, trade openness[17], and so on. EIAs can have very different economic effects, depending on the characteristics of the signatories (see for example Vicard (2011) for a study showing empirically that the effectiveness of an EIA in enhancing bilateral trade flows depends on both the economic characteristics of the country pair and the characteristics of all other members of the EIA).

Results are presented in figure 2.3. First of all, note that our results are consistent with the results from our baseline model. Deeper EIAs have larger effects effects on trade flows on average, and the effects of PTAs, FTAs and CUs are mainly driven by the extensive margin.

Furthermore, we find that the effects of EIAs on trade are qualitatively similar for most countries: most countries experience a decrease of their intensive margin, while at the same time experiencing an increase in their extensive margin. The only exceptions are Cyprus and Romania. These two countries experience a statistically significant increase in their intensive margin due to CUs, which might be explained by their proximity to Turkey. However, not all effects are statistically significant and there is great heterogeneity in the magnitude of the effects. For example, FTAs increase Ireland's extensive margin with nearly 150%, while this is only 26% for Spain and the EM effects for Poland are not statistically significant. Moreover, while we find many statistically significant effects on the margins, effects on total trade flows are less pronounced, with a majority of countries not seeing any effects of PTAs and FTAs on trade flows.

Directionality of effects

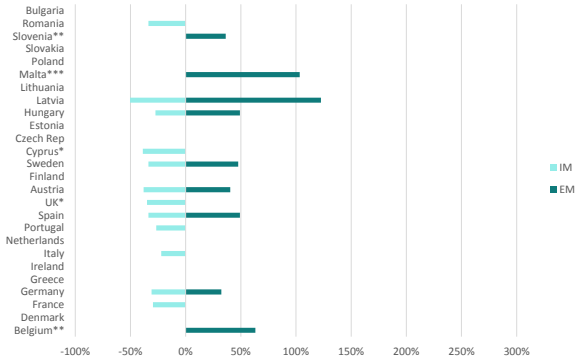
Finally, we relax the assumption that EIAs have symmetric effects on imports and exports. As most EIAs have different stipulations for imports and exports, we expect to find different effects for extra-EU imports, extra-EU exports and intra-EU trade.

Results for the baseline model are presented in table 2.5. Note that there are no intra-EU PTAs and that PTAs mainly consist of TWPTAs for

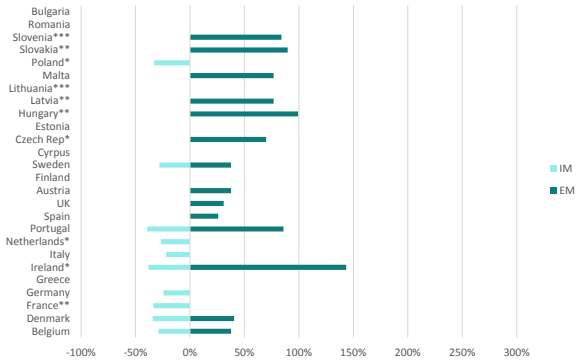
[17] Arribas, Pérez and Tortosa-Ausina (2011) for example show that there are very large differences in trade openness across the members of the European Union, with Belgium, Luxembourg, Czech Republic, Hungary, The Netherlands and Slovakia the most open countries, and Spain, the UK and especially Greece the least open.

Figure 2.3: Contemporaneous effects of different types of EIAs on trade flows of individual EU countries (in %) using a GLS estimation with 3 sets of fixed effects.

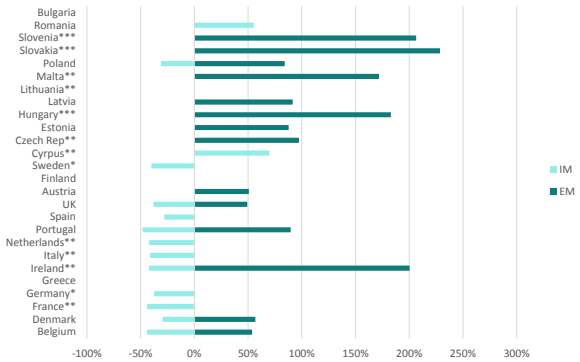
(a) Effects of PTAs.



(b) Effects of FTAs.



(c) Effects of CUs.



Note: The stars next to the agreements indicate statistical significance of the estimate for the total trade flow (*** p<0.01, ** p<0.05, * p<0.1). Only estimates for the margins which are statistically significant at the 10% threshold are shown in the graph. The full regression output can be retrieved upon request to the authors.

extra-EU exports, while for extra-EU imports both OPTAs and TWPTAs are present. Consistent with the baseline model, we find that PTAs do not have any effect on total trade flows. Looking at the margins however, we now see that PTAs increase the intensive margin with 34% for exports, while PTAs increase the extensive margin with 30% for imports. PTAs also increase the extensive margin after five years for imports, but not for exports.

Second, and most surprisingly, the effect of FTAs on trade flows is completely driven by the effect of FTAs on imports. FTAs do not have an effect on extra-EU exports. Looking at the margins, we see that FTAs have a moderately positive effect on the extensive margin for extra-EU exports, while they have a big impact for imports. After five years, FTAs have a moderately positive impact on exports, while they have a small impact on imports. Hence, the accumulated impact of FTAs on the EM is similar for imports and exports, with the impact on imports materializing faster than for exports.

Finally, looking at the estimates for CU, we find large effects for both exports and imports. Extra-EU exports increase with 75%. This is completely driven by the extensive margin. This strong effect continues up to five years after entry into force (+33%). On the import-side, we see that the effect of CUs is almost identical to the effect of FTAs on extra-EU imports.

Results for each agreement separately are presented in figure 2.4. We find that the majority of trade agreements does not have symmetric effects on imports and exports: for 12 agreements (60%) we find a positive effect on imports while no or negative effect on exports or vice versa. For the other 8 agreements, we find that effects have the same sign for both imports and exports, but the magnitude of the effects differs. Moreover, we find that EIAs have similar effects on imports and exports on average (i.e. a moderate increase), but this does not hold for each agreement separately.

Results for the different EU agreements are presented in table 2.8 in the appendix. We find that the lack of effects of TWPTAs on total trade is caused by opposing effects on imports and exports: TWPTAs decrease the intensive margin of EU imports while they increase the intensive margin of EU exports. This contraction of trade volumes is however only temporary, and is offset after five years by an expansion of the extensive margin of trade.

SAAs increase the number of products traded for both imports and exports. However, this is counteracted by a decrease in the volume traded per good for imports but not for exports, resulting in negative total trade flow effects for imports but not for exports. For ASS, we find symmetric effects on both imports and exports.

Furthermore, we find that EUFTAs have a large impact on EU imports

Table 2.5: GLS estimation of the directional effects of EIAs using 3 sets of fixed effects.

	(1)			(2)			(3)		
	X	**IM**	**EM**	**X**	**IM**	**EM**	**X**	**IM**	**EM**
Extra-EU imports									
PTA	0.03	-0.23***	0.26***	0.02	-0.22***	0.24***	0.08	-0.21**	0.29***
	(0.060)	(0.076)	(0.063)	(0.061)	(0.077)	(0.066)	(0.065)	(0.080)	(0.075)
Lag5				0.08*	-0.05	0.14***	0.06	-0.06	0.12**
				(0.046)	(0.049)	(0.042)	(0.051)	(0.048)	(0.046)
Lag10							0.07	0.00	0.07
							(0.051)	(0.054)	(0.046)
FTA	0.34***	-0.08	0.42***	0.32***	-0.08	0.40***	0.40***	-0.01	0.41***
	(0.087)	(0.080)	(0.075)	(0.084)	(0.084)	(0.077)	(0.111)	(0.091)	(0.099)
Lag5				0.12	-0.05	0.17**	0.10	-0.04	0.14*
				(0.074)	(0.061)	(0.060)	(0.082)	(0.075)	(0.071)
Lag10							0.05	-0.02	0.07
							(0.080)	(0.069)	(0.074)
CU	0.32**	0.02	0.30**	0.32**	0.04	0.28**	0.30**	0.04	0.26*
	(0.123)	(0.105)	(0.121)	(0.125)	(0.104)	(0.121)	(0.122)	(0.116)	(0.135)
Lag5				0.03	-0.13	0.16**	0.02	-0.12	0.13
				(0.091)	(0.089)	(0.073)	(0.099)	(0.107)	(0.083)
Lag10							-0.12	0.04	-0.16
							(0.096)	(0.101)	(0.111)
Extra-EU exports									
PTA	0.10	0.29***	-0.19**	0.08	0.25**	-0.17	0.15	0.29***	-0.14
	(0.124)	(0.102)	(0.089)	(0.119)	(0.100)	(0.101)	(0.126)	(0.096)	(0.121)
Lag5				0.05	0.08	-0.04	0.07	0.08	-0.02
				(0.116)	(0.086)	(0.090)	(0.126)	(0.104)	(0.097)
Lag10							0.04	-0.03	0.07
							(0.115)	(0.132)	(0.111)
FTA	0.08	-0.17	0.24*	0.08	-0.16	0.24*	0.06	-0.19	0.25*
	(0.116)	(0.117)	(0.122)	(0.112)	(0.116)	(0.118)	(0.123)	(0.138)	(0.136)
Lag5				0.11	-0.14	0.25**	0.15	-0.12	0.27**
				(0.097)	(0.088)	(0.092)	(0.105)	(0.090)	(0.092)
Lag10							-0.08	-0.20**	0.12
							(0.092)	(0.090)	(0.096)
CU	0.56***	-0.25	0.81***	0.49***	-0.25	0.75***	0.54**	-0.15	0.69**
	(0.163)	(0.156)	(0.177)	(0.146)	(0.154)	(0.176)	(0.208)	(0.176)	(0.242)
Lag5				0.35***	0.06	0.29**	0.33**	0.07	0.27**
				(0.112)	(0.112)	(0.118)	(0.121)	(0.118)	(0.120)
Lag10							-0.04	0.03	-0.06
							(0.159)	(0.165)	(0.160)
Intra-EU trade									
FTA	0.14	-0.09	0.24*	0.14	-0.09	0.23*	0.20*	0.05	0.15
	(0.092)	(0.118)	(0.117)	(0.093)	(0.117)	(0.115)	(0.114)	(0.131)	(0.131)
Lag5				0.03	-0.08	0.11*	0.03	-0.13	0.16*
				(0.060)	(0.081)	(0.062)	(0.056)	(0.096)	(0.084)
Lag10							0.05	0.08	-0.04
							(0.042)	(0.062)	(0.053)
CU	0.50***	-0.15	0.65***	0.47***	-0.13	0.61***	0.46***	-0.13	0.60***
	(0.135)	(0.103)	(0.122)	(0.127)	(0.100)	(0.124)	(0.132)	(0.112)	(0.134)
Lag5				0.14	-0.05	0.19**	0.19**	-0.03	0.23**
				(0.088)	(0.083)	(0.077)	(0.090)	(0.097)	(0.084)
Lag10							-0.12	-0.14*	0.02
							(0.072)	(0.077)	(0.076)
Observations	182,314	182,314	182,314	162,976	162,976	162,976	134,031	134,031	134,031

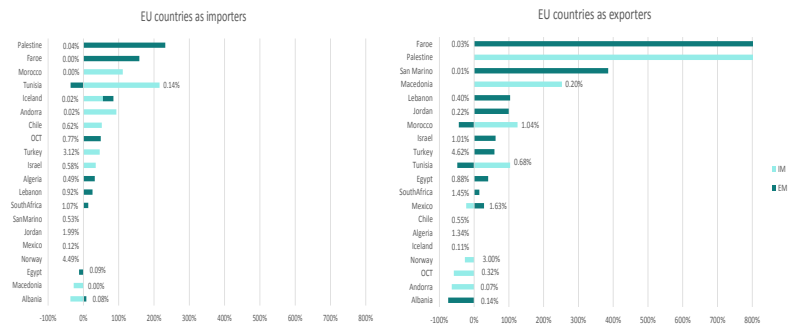
Estimation includes importer-year, exporter-year and pair fixed effects. Standard errors clustered on country pair and year in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

(+63%), but this is unimportant compared to their impact on exports (+153%). This increase in trade continues up to five years after entry into force, while we find no lagged effects for imports. However, this effect is for exports again partly offset after ten years, indicating overshooting of the initial response.

We find a similar pattern for EUCUs, which do not increase EU imports on average, but do increase exports by 54%. This positive effect on exports becomes amplified after five years, but not for imports.

Results for the impact on the individual EU countries are presented in figure 2.5. In contrast to before, we now do find negative effects on the extensive margin for PTAs and CUs for exports. We also find that FTAs and CUs have no or positive effects on extra-EU imports. This is mainly driven by the extensive margin. On the export-side, we find mixed effects of FTAs and CUs: CUs have negative effects on exports of EU15 countries (both IM and EM), but large positive effects on exports of newer EU members (completely driven by the EM, except for Hungary).

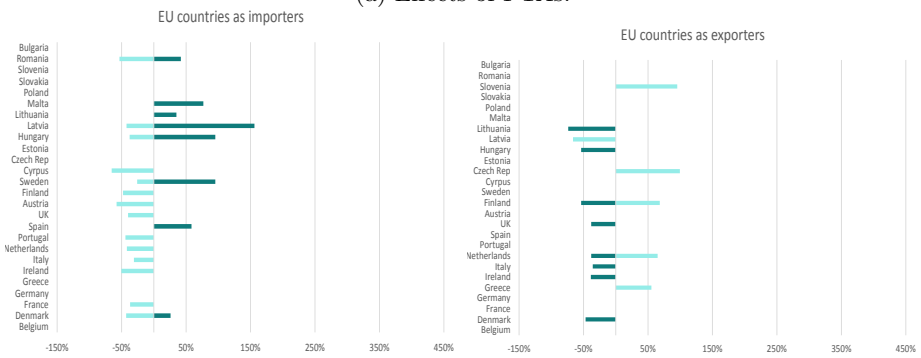
Figure 2.4: Directional contemporaneous effects° (in %) of individual EIAs using a GLS estimation with 3 sets of fixed effects.



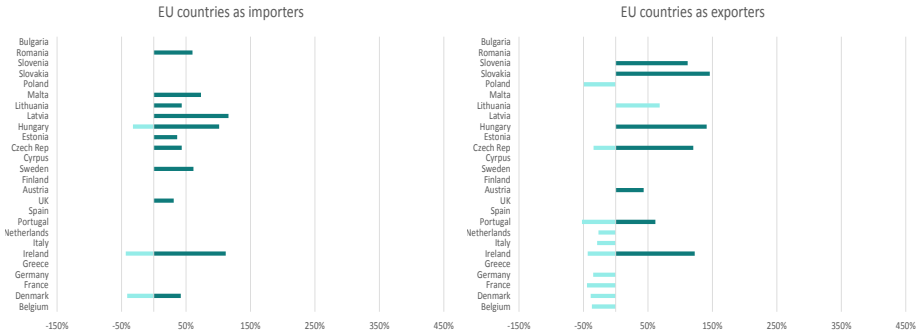
Note: The percentage next to each bar indicates the share of each country in total extra-EU imports or exports, respectively, for 2013. The stars next to the agreements indicate statistical significance of the estimate for the total trade flow (*** p<0.01, ** p<0.05, * p<0.1). Only estimates for the margins which are statistically significant at the 10% threshold are shown in the graph. The full regression output can be retrieved upon request to the authors.
° Computing total ATEs with five and ten year lags would mean that we could only look at EIAs enforced by 2003.

Figure 2.5: Directional contemporaneous effects of different types of EIAs on trade flows of individual EU countries (in %) using a GLS estimation with 3 sets of fixed effects.

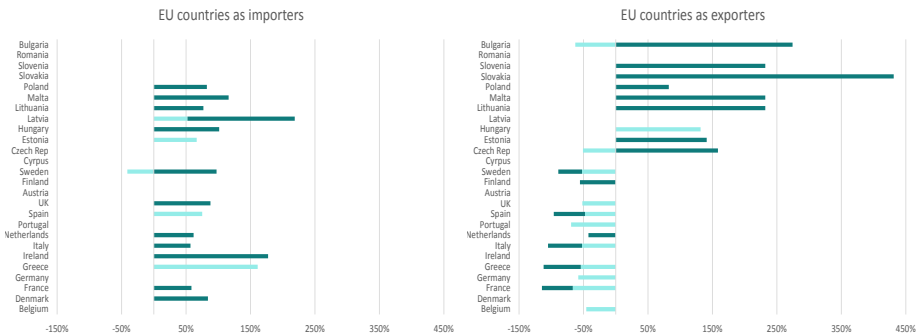
(a) Effects of PTAs.



(b) Effects of FTAs.



(c) Effects of CUs.



Note: The stars next to the countries indicate statistical significance of the estimate for the total trade flow (*** p<0.01, ** p<0.05, * p<0.1). Only estimates for the margins which are statistically significant at the 10% threshold are shown in the graph. The full regression output can be retrieved upon request to the authors.

2.5 Robustness checks

Strict exogeneity

Generalised least squares (GLS) assumes strict exogeneity. If this assumption fails, the estimation will be biased. To test for strict exogeneity, Wooldridge (2010) suggests including leads of the EIA variables in levels in the fixed effects and differences estimation. If the EIA variables are endogenous, then the leads will be significant and results for the fixed effects specification and differences specification will be different, since a violation of the strict exogeneity assumption will bias both estimators in a different way.

Results for the exogeneity test are presented in table 2.6. We computed the test with five year leads as well as with one year leads. We find that all EIAs are strictly exogenous when using our fixed effects specification. However, the assumption of strict exogeneity is violated for PTAs when using differences.

In order to assess how much our results are biased due to these violations of the strict exogeneity assumption, and also as a robustness check, we compute our extended baseline model using differences. Taking the fourth difference[18] of equation (2.3) eliminates the country pair fixed effects

$$\Delta_4 \ln X_{ijt} = \beta_0 + \beta_1 \Delta_4 PTA_{ijt} + \beta_2 \Delta_4 FTA_{ijt} + \beta_3 \Delta_4 CU_{ijt} + \Delta_4 \delta_{it} + \Delta_4 \psi_{jt} + \Delta_4 \epsilon_{ijt} \quad (2.9)$$

with Δ_4 fourth difference.

Comparing the coefficients for the baseline model obtained using the fixed effects specification in table 2.3 with the baseline model obtained using the differences specification in table 2.10 in appendix, we see that the results are very similar. This similarity also holds up for the PTA coefficient. This suggests that there is no endogeneity bias.

Changes over time of pair-specific unobservables

Neither our fixed effects specification nor differencing the data controls for changes over time in *pair-specific* unobservables. This could for example be the case when fixed or variable export costs fall due to technological improvement. To alleviate this problem partially, Trefler (2004) and Baier, Bergstrand, and Feng (2014) use a random growth first-difference model.

[18] Following Anderson and Yotov (2011), we use fourth differences instead of first differences as trade flows typically change very slowly over time, making it very likely that first differenced data will not display much of variation. We obtain very similar results using fifth differences instead of fourth differences. As the latter makes us loose one year less of data, we choose to report our results using fourth differences. Results using fifth differences can be retrieved upon request.

Table 2.6: Exogeneity test using both a GLS estimation with fixed effects and differences.

	Fixed effects		Differences	
	(1a)	(1b)	(2a)	(2b)
PTA	0.07	0.02		
FTA	0.23**	0.13*		
CU	0.46***	0.37***		
Δ_4PTA			0.04	0.02
Δ_4FTA			0.09	0.05***
Δ_4CU			0.30**	0.27***
F.PTA	-0.06		0.22*	
	(0.038)		(0.121)	
F.FTA	-0.07		0.11	
	(0.087)		(0.145)	
F.CU	0.00		0.16	
	(0.091)		(0.173)	
F5.PTA		-0.18		0.13
		(0.122)		(0.539)
F5.FTA		-0.21		0.14
		(0.176)		(0.617)
F5.CU		-0.17		0.23
		(0.179)		(0.515)

Estimations in columns (1a) and (1b) include importer-year, exporter-year and pair fixed effects, while estimations in columns (2a) and (2b) use differenced data and include importer-year and exporter-year fixed effects only. Standard errors clustered on country pair and year in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

By including country pair-specific fixed effects in our differenced model, we can account for changes in pair specific unobservables that evolve smoothly over time.

This transforms our difference model in the following way:

$$\Delta_4 \ln X_{ijt} = \beta_0 + \beta_1 \Delta_4 PTA_{ijt} + \beta_2 \Delta_4 FTA_{ijt} + \beta_3 \Delta_4 CU_{ijt} + \Delta_4 \delta_{it} + \Delta_4 \psi_{jt} + \eta_{ij} + \Delta_4 \epsilon_{ijt} \quad (2.10)$$

Another option is to use our fixed effects specification and include country pair fixed effects interacted with a time trend. Our fixed effects specification then becomes

$$\ln X_{ijt} = \beta_0 + \beta_1 PTA_{ijt} + \beta_2 FTA_{ijt} + \beta_3 CU_{ijt} + \delta_{it} + \psi_{jt} + \eta_{ij} + \eta_{ij}.t + \epsilon_{ijt} \quad (2.11)$$

with t time trend.

Results are presented in table 2.11 and 2.12 in the appendix. First of all, note that the results for both the fixed effects specification and the differences specification are very similar. This again strengthens our belief that the possible bias stemming from endogeneity of the EIA dummies is very small.

Second, we see that most estimates fail to reach statistical significance. FTAs and CUs do no longer have a statistically significant contemporaneous impact on total trade flows. This is because standard errors are larger for

most estimates as well as because the magnitude of most coefficients is smaller. We do however find positive and statistically significant contemporaneous effect of PTAs and CUs on the extensive margin. This effect is partially offset for CUs by a negative effect after ten years.

Zero trade flows

Our baseline model is estimated using the log transformation of trade flows. As the log transformation of zero is not defined, this implies that zero trade flows will be ignored when estimating our model. To alleviate this problem, Santos Silva and Tenreyro (2006) suggest to estimate the gravity model multiplicatively using the Poisson Pseudo Maximum Likelihood estimator. While it is so far computationally impossible to estimate a model with three large sets of fixed effects, it is possible to estimate a model with two large sets of fixed effects since the introduction of the $poi2hdfe$ command for Stata (Guimaraes and Portugal, 2010). As the command only works with positive observations, demeaning the data or taking first differences to absorb the pair-dimension is not an option. We therefore estimate our model twice, once only including importer-year and exporter-year fixed effects, and once only including pair and year dummies. To minimize ommitted variable bias, we include typical gravity covariates that vary along the ij-dimension in the former, while we include typical gravity covariates that vary along the it- and jt-dimension in the latter.

We thus estimate the two following specifications:

$$X_{ijt} = \beta_0 + \beta_1 PTA_{ijt} + \beta_2 FTA_{ijt} + \beta_3 CU_{ijt} + \gamma \mathbf{covariates}_1 + \delta_{it} + \psi_{jt} + \epsilon_{ijt} \quad (2.12)$$

$$X_{ijt} = \beta_0 + \beta_1 PTA_{ijt} + \beta_2 FTA_{ijt} + \beta_3 CU_{ijt} + \gamma \mathbf{covariates}_2 + \delta_{ij} + \psi_t + \epsilon_{ijt} \quad (2.13)$$

with $\mathbf{covariates}_1$ a vector consisting of the distance between the capitals of a country pair, a dummy taking value 1 if a country pair shares a common language, a dummy taking value 1 if a country pair shares a common border and a dummy taking value 1 if a country pair has shared colonial ties at some point in time, and $\mathbf{covariates}_2$ a vector consisting of the log of GDP for country i at time t and the log of GDP for country j at time t. All covariates come from the CEPII BACI dataset.

Results are presented in table 2.13 in the appendix. We find very different results for the trade agreement coefficients in set 1 compared to set 2. While PTAs, FTAs and CUs have large trade creating effects in set 1, they have negative effects on trade flows in set 2. This suggests that our results are biased due to ommitted variables. This because we

do not account properly for the multilateral resistance term in set 1 and self-selection of country pairs into trade agreements in set 2. As has been shown by Baier and Bergstrand (2007), this can severely bias the results.

2.6 Conclusion

This paper sheds new light on the impact of trade agreements on international trade patterns. It puts the traditional trade-creation effects of EIAs into a new perspective by pointing to various heterogeneous effects underpinning the general macro impact. New evidence is provided for the trade impact of EIAs negotiated by the EU with various trading partners in the period 1988 2013. Our findings have important implications for future trade policy, as well as for the international competitiveness of open economies.

First of all, we confirm the trade-creation effect of EIAs, but the size of the effect depends on the degree of integration implied by the agreement. FTAs and CUs clearly generate stronger cumulative trade effects than PTAs. Hence, effective trade integration requires deep integration. Moreover, the impact may follow the implementation of the agreement with a time lag. Hence, evaluating new agreements may lead to the wrong conclusion that trade is not affected. The actual impact may require some time to materialize.

A second striking finding is the crucial role of the extensive margin of trade. Trade is boosted by EIAs through increased product differentiation in exports and imports. This effect may also materialize later on, especially for exports under FTAs. Hence, EIAs open the door to trade in additional products rather than intensifying trade in previously exported products. Thus, on the one hand, companies can benefit from EIAs by launching new products for the destination markets covered by EU trade agreements. On the other hand, the value of traded products may decline.

Our results also indicate that the findings for one particular agreement or EU Member State cannot be generalized for all agreements or EU Member States. Although the impact across EU Member States differs, EIAs positively affect the extensive margin and negatively affect the intensive margin for almost all trade by the EU Member States. Hence, the positive role of the extensive margin can be confirmed at the level of the individual Member States. Moreover, EIAs with a clear economic rationale appear to boost trade the most. Hence, EIAs signed for merely political reasons do not make much economic sense.

In sum, EIAs are an excellent tool to increase product differentiation and, through such differentiation, international trade. As many trading firms are confronted with significant barriers to entry into new markets or

for new products, this specific effect of EIAs is very important in improving international competitiveness and boosting international trade.

2.7 Appendix

Table 2.7: EIAs in force between the EU and third countries for the period 1988-2013.

Date	Agreement	EIA	Type	Date	Agreement	EIA	Type
1964	EU-Turkey	PTA	TWPTA	2004	EU-Egypt	FTA	ASS
1971	EU-OCT	FTA	other	2004	EU-Montenegro	FTA	SAA
1973	EU-Liechtenstein	FTA	EUFTA	2005	EU-Algeria	FTA	ASS
1973	EU-Switzerland	FTA	EUFTA	2006	EU-Albania	FTA	SAA
1973	EU-Iceland	FTA	EUFTA	2008	EU-Bosnia-Herz.	FTA	SAA
1973	EU-Norway	FTA	EUFTA	2009	EU-Swaziland	PTA	TWPTA
1978	EU-Algeria	PTA	TWPTA	2009	EU-CARIFORUM	PTA	TWPTA
1978	EU-Egypt	PTA	TWPTA	2009	EU-Mozambique	PTA	TWPTA
1991	EU-Andorra	CU	EUCU	2009	EU-Namibia	PTA	TWPTA
1992	EU-Albania	PTA	TWPTA	2009	EU-Madagascar	PTA	TWPTA
1994	EU-Liechtenstein	CM	EUCU	2009	EU-Lesotho	PTA	TWPTA
1994	EU-Iceland	CM	EUCU	2009	EU-Botswana	PTA	TWPTA
1994	EU-Norway	CM	EUCU	2009	EU-Cameroon	PTA	TWPTA
1995	EU-Israel	FTA	ASS	2009	EU-Zimbabwe	PTA	TWPTA
1996	EU-Turkey	CU	EUCU	2009	EU-Mauritius	PTA	TWPTA
1997	EU-Faeroe Islands	FTA	EUFTA	2009	EU-Seychelles	PTA	TWPTA
1997	EU-Palestine	FTA	ASS	2010	EU-Serbia	FTA	SAA
1998	EU-Tunisia	FTA	ASS	2011	EU-Papua N. Guinea	PTA	TWPTA
2000	EU-South Africa	FTA	other	2011	EU-South Korea	FTA	EUFTA
2000	EU-Morocco	FTA	ASS	2012	EU-Iraq	PTA	TWPTA
2000	EU-Mexico	FTA	EUFTA	2013	EU-Nicaragua	FTA	ASS
2001	EU-Macedonia	FTA	SAA	2013	EU-Honduras	FTA	ASS
2002	EU-Jordan	FTA	ASS	2013	EU-Peru	FTA	EUFTA
2002	EU-San Marino	CU	EUCU	2013	EU-Panama	FTA	ASS
2003	EU-Lebanon	FTA	ASS	2013	EU-Colombia	FTA	EUFTA
2003	EU-Chile	FTA	EUFTA				

Date refers to the (provisional) entry into force of an agreement. TWPTA: two-way PTA, ASS: Association Agreement, SAA: Stabilisation and Association Agreement, EUFTA: EU FTA. Generalised scheme of Preferences, GSP+ and Everything but Arms have been ommitted from the list due to space constraints. These schemes contains OPTAs with virtually all developing countries since the 1970s. EIAs with European countries before they were part of the EU have also been ommitted from this list due to space constraints.

Table 2.8: GLS estimation of the directional effects of motivation and degree of privelege of EIAs using 3 sets of fixed effects.

	(1)			(2)			(3)		
	X	IM	EM	X	IM	EM	X	IM	EM
Extra-EU imports									
TWPTA	-0.15	-0.37**	0.22	-0.20	-0.37**	0.18	-0.15	-0.31	0.16
	(0.161)	(0.159)	(0.128)	(0.149)	(0.154)	(0.126)	(0.149)	(0.205)	(0.164)
Lag5				0.16	-0.02	0.18**	0.15	-0.08	0.23**
				(0.124)	(0.111)	(0.069)	(0.150)	(0.126)	(0.090)
Lag10							0.05	0.07	-0.02
							(0.165)	(0.114)	(0.106)
SAA	-0.67**	-0.81***	0.14***	-0.73***	-0.88***	0.16	-0.66***	-0.83**	0.17
	(0.282)	(0.272)	(0.071)	(0.350)	(0.291)	(0.093)	(0.352)	(0.298)	(0.109)
Lag5				-0.10	-0.38**	0.27**	-0.11	-0.40**	0.30***
				(0.228)	(0.159)	(0.124)	(0.257)	(0.173)	(0.139)
ASS	0.27**	0.31**	-0.04	0.27**	0.32**	-0.04	0.29***	0.27***	0.01
	(0.110)	(0.120)	(0.082)	(0.108)	(0.125)	(0.085)	(0.134)	(0.155)	(0.088)
Lag5				0.15	-0.04	0.19***	0.19***	-0.04	0.23***
				(0.089)	(0.098)	(0.042)	(0.094)	(0.105)	(0.055)
Lag10							0.17	0.06	0.11
							(0.121)	(0.132)	(0.077)
EUFTA	0.49**	0.01	0.48**	0.47***	0.00	0.47**	0.52***	0.12	0.40***
	(0.228)	(0.213)	(0.206)	(0.229)	(0.216)	(0.205)	(0.276)	(0.258)	(0.218)
Lag5				0.03	-0.13	0.16	0.07	-0.14	0.20
				(0.089)	(0.103)	(0.096)	(0.100)	(0.142)	(0.126)
Lag10							-0.05	0.00	-0.05
							(0.105)	(0.106)	(0.075)
EUCU	0.14	-0.02	0.16	0.14	0.00	0.13	0.14	0.04	0.11
	(0.105)	(0.106)	(0.102)	(0.108)	(0.107)	(0.107)	(0.098)	(0.118)	(0.113)
Lag5				0.04	-0.13	0.17**	0.03	-0.13	0.16***
				(0.086)	(0.086)	(0.066)	(0.097)	(0.102)	(0.079)
Lag10							-0.08	0.10	-0.18
							(0.111)	(0.112)	(0.113)
Extra-EU exports									
TWPTA	0.14	0.37***	-0.23	0.08	0.27	-0.19	0.19	0.34	-0.16
	(0.250)	(0.215)	(0.169)	(0.244)	(0.202)	(0.179)	(0.261)	(0.197)	(0.218)
Lag5				0.18	0.24***	-0.06	0.26	0.28	-0.02
				(0.197)	(0.136)	(0.144)	(0.239)	(0.186)	(0.176)
Lag10							0.03	0.01	0.02
							(0.177)	(0.166)	(0.165)
SAA	0.56	0.18	0.38***	0.49	0.10	0.39**	0.46	0.05	0.41**
	(0.345)	(0.411)	(0.115)	(0.310)	(0.415)	(0.162)	(0.335)	(0.431)	(0.162)
Lag5				-0.28	-0.35***	0.07	-0.35	-0.43**	0.08
				(0.234)	(0.185)	(0.162)	(0.232)	(0.195)	(0.151)
ASS	0.30***	0.32**	-0.02	0.35**	0.35**	-0.00	0.24	0.16	0.07
	(0.149)	(0.146)	(0.114)	(0.159)	(0.149)	(0.117)	(0.180)	(0.126)	(0.117)
Lag5				0.19	0.06	0.13	0.13	-0.00	0.14
				(0.122)	(0.111)	(0.091)	(0.148)	(0.129)	(0.094)
Lag10							-0.18	-0.27	0.08
							(0.177)	(0.161)	(0.127)
EUFTA	0.93**	-0.58**	1.51***	0.93**	-0.59**	1.52***	0.91***	-0.38**	1.29***
	(0.361)	(0.269)	(0.476)	(0.351)	(0.260)	(0.442)	(0.299)	(0.136)	(0.277)
Lag5				0.30***	-0.29**	0.59***	0.41**	-0.26	0.67***
				(0.154)	(0.134)	(0.165)	(0.179)	(0.168)	(0.174)
Lag10							-0.39**	-0.12	-0.27
							(0.166)	(0.185)	(0.234)
EUCU	0.43***	-0.26***	0.69***	0.32**	-0.25	0.56***	0.37***	-0.15	0.53**
	(0.151)	(0.154)	(0.164)	(0.143)	(0.158)	(0.173)	(0.201)	(0.180)	(0.226)
Lag5				0.39***	0.05	0.34***	0.39***	0.08	0.32**
				(0.108)	(0.112)	(0.111)	(0.115)	(0.118)	(0.114)
Lag10							-0.15	0.01	-0.15
							(0.190)	(0.200)	(0.225)
Observations	182,314	182,314	182,314	162,976	162,976	162,976	134,031	134,031	134,031

Estimation includes importer-year, exporter-year and pair fixed effects. Standard errors are clustered on country pair and year but are ommitted due to space constraints. *** p<0.01, ** p<0.05, * p<0.1. Coefficients for EBA, GSP and intra-EU EIAs are ommitted due to space constraints. Full results can be retrieved upon request. For a list of agreements per category, see table 2.7 in the appendix.

Table 2.9: GLS estimation of the effects per agreement using 3 sets of fixed effects.

	X	IM	EM
OCT	-0.06	-0.50***	0.44**
	(0.142)	(0.152)	(0.170)
Egypt	-0.09	-0.27	0.18**
	(0.192)	(0.163)	(0.086)
Iceland	0.63***	0.20	0.42**
	(0.195)	(0.182)	(0.175)
Norway	-0.01	-0.18	0.17
	(0.134)	(0.128)	(0.103)
Algeria	0.71	0.10	0.61
	(0.964)	(0.564)	(0.444)
Andorra	-0.05	-0.26	0.20
	(0.312)	(0.369)	(0.434)
Turkey	0.40**	0.10	0.30***
	(0.169)	(0.167)	(0.083)
Faroe	1.53***	-0.62*	2.15***
	(0.385)	(0.341)	(0.531)
Palestine	1.56***	1.03	0.53
	(0.382)	(0.650)	(0.637)
Macedonia	0.45**	0.38	0.07
	(0.204)	(0.245)	(0.138)
Jordan	0.37*	-0.04	0.41***
	(0.200)	(0.162)	(0.079)
San Marino	0.84***	-0.21	1.05***
	(0.272)	(0.264)	(0.250)
Chile	-0.03	-0.07	0.04
	(0.195)	(0.150)	(0.083)
Lebanon	0.47**	-0.06	0.53***
	(0.222)	(0.190)	(0.092)
Albania	-0.89***	-0.42***	-0.47**
	(0.123)	(0.136)	(0.198)
Israel	0.40***	0.05	0.35***
	(0.118)	(0.109)	(0.074)
Morocco	0.24	0.72***	-0.48***
	(0.182)	(0.194)	(0.147)
Tunisia	0.37*	0.87***	-0.49***
	(0.208)	(0.186)	(0.132)
Mexico	0.14	0.02	0.12
	(0.177)	(0.177)	(0.077)
South Africa	0.28*	0.10	0.18***
	(0.159)	(0.140)	(0.051)
Control	-0.00	-0.14**	0.14***
	(0.045)	(0.064)	(0.047)
Observations	182,314	182,314	182,314

Estimation includes importer-year, exporter-year and pair fixed effects. Standard errors clustered on country pair and year in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 2.10: Estimation of the baseline model using fourth differences.

	(1)			(2)			(3)		
	X	**IM**	**EM**	**X**	**IM**	**EM**	**X**	**IM**	**EM**
Δ_4PTA	0.04	-0.12	0.16***	0.06	-0.12*	0.18***	0.11*	-0.08	0.19***
	(0.059)	(0.070)	(0.040)	(0.057)	(0.068)	(0.040)	(0.060)	(0.065)	(0.038)
Lag5				0.05	-0.02	0.08*	0.05	-0.02	0.08
				(0.039)	(0.045)	(0.039)	(0.046)	(0.054)	(0.044)
Lag10							0.02	0.00	0.02
							(0.034)	(0.051)	(0.036)
Δ_4FTA	0.09	-0.01	0.10	0.11	-0.01	0.12	0.20**	0.02	0.18**
	(0.070)	(0.059)	(0.066)	(0.071)	(0.063)	(0.073)	(0.073)	(0.071)	(0.062)
Lag5				0.07*	-0.02	0.09*	0.11**	-0.03	0.13**
				(0.039)	(0.066)	(0.053)	(0.044)	(0.075)	(0.058)
Lag10							0.02	0.02	-0.01
							(0.037)	(0.044)	(0.035)
Δ_4CU	0.30**	-0.11	0.41***	0.32**	-0.10	0.42***	0.41***	-0.04	0.46***
	(0.117)	(0.067)	(0.132)	(0.118)	(0.066)	(0.136)	(0.103)	(0.075)	(0.111)
Lag5				0.10**	0.04	0.05	0.12**	0.04	0.08
				(0.042)	(0.064)	(0.057)	(0.050)	(0.079)	(0.072)
Lag10							-0.09	-0.04	-0.05
							(0.066)	(0.100)	(0.094)
Total ATE									
Δ_4PTA							0.18**	-0.10	0.28***
							(0.071)	(0.074)	(0.050)
Δ_4FTA							0.32***	0.02	0.30**
							(0.096)	(0.135)	(0.120)
Δ_4CU							0.44**	-0.05	0.49**
							(0.161)	(0.179)	(0.214)
Observations	138,266	138,266	138,266	119,478	119,478	119,478	91,759	91,759	91,759

Table 2.11: Estimation of the baseline model using a random growth model.

	(1)			(2)			(3)		
	X	**IM**	**EM**	**X**	**IM**	**EM**	**X**	**IM**	**EM**
Δ_4PTA	0.04	-0.10	0.14***	0.06	-0.11	0.17***	0.10	-0.08	0.17**
	(0.073)	(0.086)	(0.051)	(0.075)	(0.087)	(0.055)	(0.086)	(0.089)	(0.064)
Lag5				0.03	-0.02	0.06	-0.02	-0.06	0.04
				(0.042)	(0.058)	(0.051)	(0.050)	(0.070)	(0.053)
Lag150							-0.07	-0.05	-0.02
							(0.050)	(0.066)	(0.057)
Δ_4FTA	0.04	-0.01	0.04	0.06	0.01	0.05	0.11	0.03	0.08
	(0.093)	(0.084)	(0.069)	(0.099)	(0.084)	(0.075)	(0.113)	(0.095)	(0.075)
Lag5				0.04	0.04	0.00	0.06	0.03	0.02
				(0.035)	(0.042)	(0.042)	(0.046)	(0.056)	(0.053)
Lag10							0.00	0.06	-0.06
							(0.047)	(0.038)	(0.036)
Δ_4CU	0.20	-0.18*	0.38**	0.21	-0.16	0.37**	0.29*	-0.08	0.37**
	(0.134)	(0.096)	(0.152)	(0.144)	(0.097)	(0.168)	(0.148)	(0.113)	(0.146)
Lag5				0.02	0.05	-0.03	0.00	0.06	-0.06
				(0.062)	(0.060)	(0.080)	(0.066)	(0.080)	(0.091)
Lag10							-0.12	-0.02	-0.10
							(0.080)	(0.100)	(0.088)
Total ATE									
Δ_4PTA							0.01	-0.18	0.19*
							(0.109)	(0.132)	(0.105)
Δ_4FTA							0.17	0.13	0.05
							(0.163)	(0.135)	(0.118))
Δ_4CU							0.17	-0.04	0.21
							(0.239)	(0.215)	(0.208)
Observations	137,907	137,907	137,907	119 108	119 108	11,9108	91,371	91,371	91,371

Standard errors clustered on country pair and year in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Total average treatment effects (ATEs) are computed using a two-tailed joint significance test.

Table 2.12: GLS estimation of the baseline model using fixed effects and a time trend.

	(1)			(2)			(3)		
	X	**IM**	**EM**	**X**	**IM**	**EM**	**X**	**IM**	**EM**
PTA	0.01	-0.11	0.12**	0.01	-0.11	0.12**	0.03	-0.07	0.11*
	(0.072)	(0.073)	(0.047)	(0.077)	(0.075)	(0.048)	(0.074)	(0.074)	(0.054)
Lag5				0.00	-0.01	0.02	-0.06	-0.06	-0.00
				(0.051)	(0.055)	(0.044)	(0.061)	(0.069)	(0.050)
Lag10							-0.08*	-0.06	-0.02
							(0.043)	(0.055)	(0.042)
FTA	0.07	-0.01	0.08	0.08	0.01	0.07	0.11	0.03	0.07
	(0.094)	(0.086)	(0.071)	(0.097)	(0.085)	(0.071)	(0.103)	(0.091)	(0.075)
Lag5				0.02	0.05	-0.03	0.00	0.03	-0.02
				(0.041)	(0.039)	(0.040)	(0.053)	(0.047)	(0.045)
Lag10							0.00	0.05	-0.05
							(0.042)	(0.036)	(0.035)
CU	0.22	-0.14	0.36*	0.22	-0.13	0.35*	0.26	-0.09	0.35*
	(0.155)	(0.107)	(0.185)	(0.162)	(0.104)	(0.191)	(0.168)	(0.104)	(0.183)
Lag5				0.02	0.03	-0.02	-0.01	0.02	-0.03
				(0.058)	(0.062)	(0.064)	(0.071)	(0.069)	(0.069)
Lag10							-0.12*	-0.00	-0.12
							(0.067)	(0.075)	(0.070)
Total ATE									
PTA							-0.10	-0.18	0.09
							(0.110)	(0.119)	(0.087)
FTA							0.11	0.11	0.0
							(0.150)	(0.131)	(0.114)
CU							0.13	-0.07	0.20
							(0.238)	(0.166)	(0.252)
Observations	182,314	182,314	182,314	162,976	162,976	162,976	134,031	134,031	134,031

Standard errors clustered on country pair and year in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Total average treatment effects (ATEs) are computed using a two-tailed joint significance test.

Table 2.13: PPML estimation of the baseline model in multiplicative form.

	(1)			(2)			(3)		
	X	**IM**	**EM**	**X**	**IM**	**EM**	**X**	**IM**	**EM**
					Set 1				
PTA	0.22***	1.17***	-0.37***	0.22***	1.09***	-0.37***	0.21***	0.84***	-0.37***
	(0.016)	(0.409)	(0.070)	(0.016)	(0.371)	(0.070)	(0.016)	(0.281)	(0.071)
Lag 5				0.04***	-0.02	-0.03	0.03**	0.01	-0.02
				(0.012)	(0.213)	(0.055)	(0.012)	(0.206)	(0.057)
Lag 10							0.03**	0.53**	0.03
							(0.015)	(0.248)	(0.061)
FTA	0.40***	0.64*	-0.33***	0.41***	0.46	-0.31***	0.40***	0.38	-0.36***
	(0.020)	(0.355)	(0.052)	(0.020)	(0.418)	(0.067)	(0.020)	(0.325)	(0.067)
Lag 5				-0.03**	0.26	-0.07	-0.04***	0.15	-0.17
				(0.016)	(0.313)	(0.092)	(0.016)	(0.379)	(0.106)
Lag 10							0.09***	0.38	0.33***
							(0.020)	(0.330)	(0.120)
CU	0.81***	0.70	-0.52***	0.83***	0.46	-0.48***	0.80***	0.14	-0.51***
	(0.025)	(0.433)	(0.057)	(0.026)	(0.445)	(0.063)	(0.026)	(0.311)	(0.069)
Lag 5				-0.07***	0.99	-0.14*	-0.09***	0.90	-0.06
				(0.025)	(0.759)	(0.079)	(0.025)	(0.767)	(0.080)
Lag 10							0.18***	1.69	-0.20**
							(0.025)	(1.157)	(0.097)
Ln(GDP$_i$)	0.82***	-0.96***	0.57***	0.82***	-0.89**	0.57***	0.81***	-0.91**	0.57***
	(0.013)	(0.355)	(0.070)	(0.013)	(0.395)	(0.071)	(0.013)	(0.386)	(0.070)
Ln(GDP$_j$)	0.72***	-0.09	-0.39***	0.71***	-0.11	-0.39***	0.70***	-0.08	-0.39***
	(0.013)	(0.232)	(0.042)	(0.014)	(0.228)	(0.042)	(0.014)	(0.170)	(0.043)
					Set 2				
PTA	-0.21***	0.21	-0.05	-0.21***	0.19	-0.05	-0.20**	0.17	-0.06
	(0.036)	(0.221)	(0.142)	(0.079)	(0.280)	(0.161)	(0.079)	(0.263)	(0.161)
Lag 5				-0.15***	-0.01	0.07	-0.14**	-0.02	0.08
				(0.058)	(0.099)	(0.106)	(0.056)	(0.100)	(0.108)
Lag 10							-0.01	0.29***	-0.06
							(0.057)	(0.093)	(0.096)
FTA	-0.12***	-0.15	0.65***	-0.10	-0.16	0.65***	-0.09	-0.18	0.65***
	(0.042)	(0.171)	(0.135)	(0.082)	(0.213)	(0.200)	(0.083)	(0.203)	(0.201)
Lag 5				-0.05	0.16	0.30*	-0.04	0.18*	0.29*
				(0.074)	(0.108)	(0.160)	(0.074)	(0.106)	(0.162)
Lag 10							0.08	0.13	-0.02
							(0.078)	(0.085)	(0.130)
CU	-0.82***	-0.35	-0.88***	-0.76***	-0.36	-0.87***	-0.74***	-0.36	-0.89***
	(0.058)	(0.254)	(0.142)	(0.121)	(0.336)	(0.206)	(0.121)	(0.320)	(0.211)
Lag 5				-0.02	-0.12	0.30	-0.03	-0.16	0.36
				(0.117)	(0.155)	(0.219)	(0.116)	(0.159)	(0.247)
Lag 10							0.14	0.39***	-0.19
							(0.115)	(0.152)	(0.221)
Contig	0.48***	0.78***	-1.01***	0.47***	0.78***	-1.07***	0.47***	0.78***	-1.07***
	(0.017)	(0.086)	(0.110)	(0.073)	(0.151)	(0.387)	(0.073)	(0.149)	(0.389)
Comlang	0.21***	-0.08	0.39***	0.21***	-0.07	0.39***	0.22***	-0.05	0.38***
	(0.020)	(0.085)	(0.064)	(0.080)	(0.115)	(0.103)	(0.082)	(0.111)	(0.103)
Colony	0.39***	0.45***	0.44***	0.40***	0.45***	0.44***	0.40***	0.44***	0.44***
	(0.019)	(0.051)	(0.064)	(0.077)	(0.080)	(0.098)	(0.077)	(0.078)	(0.098)
Ln(dist)	-0.57***	-0.64***	-0.76***	-0.58***	-0.65***	-0.78***	-0.59***	-0.64***	-0.77***
	(0.011)	(0.058)	(0.060)	(0.047)	(0.080)	(0.103)	(0.047)	(0.080)	(0.103)
FE set 1	it, jt	it, jt	it, jt	it, jt	it, jt	it, jt	it, jt	it, jt	it, jt
FE set 2	ij, t	ij, t	ij, t	ij, t	ij, t	ij, t	ij, t	ij, t	ij, t
Obs. set 1	205,362	205,343	206,226	204,534	204,515	205,394	204,017	203,998	204,877
Obs. set 2	226,105	226,105	226,105	224,775	224,775	224,775	223,596	223,596	223,596

Standard errors clustered on country pair and year in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Total average treatment effects (ATEs) are computed using a two-tailed joint significance test.

Chapter 3

Anticipation effects of trade agreements

3.1 Introduction

This chapter picks up where the previous chapter left off. As discussed, economic integration agreements keep on attracting unremitting attention. Therefore, it is important to determine the exact impact these agreements have, from an academic point of view as well as a policy point of view. A lot is already known about the static effects of trade agreements: from trade diversion and trade creation (see for example Frankel, Stein, and Wei, 1995; Bayoumi and Eichengreen, 1997; Soloaga and Winters, 2001; Carrere, 2006; Lee and Shin, 2006; Magee, 2008), over welfare effects and price effects (see for example Freund, 2000b or Breinlich, Dhingra, and Ottaviano, 2016) and differences in design of trade agreements (Kohl, Brakman, and Garretsen, 2016; Dür, Baccini, and Elsig, 2014) to studies comparing the impact of trade agreements on different sectors (see for example Soete and Van Hove, 2016; Márquez-Ramos, Florensa, and Recalde, 2015).

Recently, empirical papers also started paying attention to the long-term effects of trade agreements and the timing of trade policy effects: Baier and Bergstrand (2007) and Baier, Bergstrand, and Feng (2014), for example, estimate the partial equilibrium impact of trade agreements on trade flows up to 15 years after entry into force, while Magee (2008) estimates how the effects of different types of trade agreements on trade flows changes over time and Iacovone and Javorcik (2010) examine product-level dynamics within firms following NAFTA.

However, a lot less is known about what happens before entry into force: most empirical and theoretical studies assume (implicitly) that trade agreements only have effects after their enter into force. If firms are forward-looking, though, we should observe some effect of EIAs before their entry

into force. This because of first-mover advantages. In a seminal literature review, Lieberman and Montgomery (1988) define a first-mover advantage as "the ability of pioneering firms to earn positive economic profits (i.e. profits in excess of the cost of capital)." With first-mover we refer to the first firm to enter a market supported by sizeable investments in the production and distribution of the product, where the elapsed time between its entry and that of later entrants is of sufficient magnitude allowing the first-mover to achieve advantageous resource positions. The term early entrants is used when there are multiple firms entering a market in short succession that are all able to achieve advantegeous resource positions (Martínez-López, 2014).

First-movers or early entrants have been found to achieve higher market shares and profitability than non-innovative late entrants in many industries and product-markets (see for example Lambkin, 1988; Shankar, 1998; Kerin, Varadarajan, and Peterson, 1992; Lilien and Yoon, 1990). The literature has identified three main mechanisms through which these first-mover advantages arise: technological leadership, preemption of scarce assets, and switching costs/buyer choice under uncertainty (Lieberman and Montgomery, 1988). Moreover, late entry into foreign markets after many other foreign firms have entered and established strong positions, has also been found to raise the cost of operations and intensify retaliation by established first-movers (Mitchell, Shaver, and Yeung, 1994; Sapienza et al., 2006).

The first-mover advantage literature builds on the central insight of non-cooperative game theory that a commitment to a course of action confers a strategic advantage, with Von Stackelberg (1934) illustrating the advantage of moving first in a duopoly context (Bagwell, 1992).

Evidence of the existence of first-mover advantages in relation to trade agreements, can be found in Freund (2000a). Constructing a three-country two-period model with quantity competition and sunk costs, she finds that a regional agreement in the first period, followed by free trade in the second period, leads to permanently greater trade among the member nations. Permanent effects arise because firms undertake irreversible investment before free trade is achieved. Moreover, using the European Union integration process as a natural experiment, she finds evidence that supports the predictions from her model, namely that founding members of the EU were able to establish trade links that persist after other countries entered the union. By 1990, the original six members still traded over 75 percent more with each other than with the later entrants of the EU (see also Abraham et al., 2002).

There are only a handful studies that estimate anticipation effects of trade agreements empirically (namely Freund and McLaren, 1999; Magee, 2008; Florensa, Márquez-Ramos, and Recalde, 2015; Coulibaly, 2009; Elliott

and Ikemoto, 2004; Bergin and Lin, 2012 Kose, Towe, and Meredith, 2004 and Lakatos and Nilsson, 2015). Typically, these studies look at anticipation effects by estimating what happens t years before an EIA enters into force. This is a valid strategy for what Kohl (2014) calls "specialist" studies (such as Bergin and Lin, 2012 studying EMU, Kose, Towe, and Meredith, 2004 studying NAFTA and Lakatos and Nilsson, 2015 studying the EU-Korea FTA). However, for so-called "generalist" papers studying a multitude of EIAs, this strategy has some severe shortcomings. First of all, as this strategy only looks at EIAs that have entered into force, it ignores possible anticipation effects of EIAs that were negotiated but did not enter into force yet or will never enter into force due to a suspension of the talks or failure to ratify the agreement. This introduces bias in the results. Second, the stages of the lifetime of an EIA have very different durations across EIAs: some trade agreements go through the whole pre-implementation process in less than three years, while for other EIAs the negotiation process drags on eternally. By looking at an average effect five or four years prior to the entry into force, it becomes impossible to link the results to any particular pre-implementation stage.

To the best of our knowledge, there is only one study so far that estimates the effects of the different stages of EIAs on trade flows directly. Mölders and Volz (2011) estimate the anticipation effects of EIAs for 14 East Asian countries by augmenting the gravity model with dummies reflecting the 5 different stages in the lifetime of an EIA. However, they limit their results to the impact on total trade flows only and they do not distinguish between different types of EIAs. As Baier, Bergstrand, and Feng (2014) and Soete and Van Hove (2017) amongst others have shown, deeper EIAs such as FTAs and CUs have a larger impact on trade flows than the more shallow PTAs. Moreover, they only include countries in their dataset that have at least one connection to an East Asian country via an FTA.

Our study wants to fill this gap. We contribute to the literature by looking more closely at the different stages of the lifetime of an EIA and estimating the impact each stage has on trade. As such, this chapter complements the previous chapter of this dissertation, which looked solely at the effects of trade agreements after entry into force. We do this by augmenting the gravity model with a dummy for each stage in the lifetime of an EIA. We use a panel on aggregate trade flows between 27 EU countries and 201 third countries and territories for the period of 1988-2013, and control for endogeneity of EIAs and multilateral resistance.

Our results clearly indicate the existence of anticipation effects. These anticipation effects are non-negligible in size. For some EU Member States, they are even more important than the impact of trade agreements on trade flows after they enter into force. It is therefore important to take anticipation effects into account when estimating the total partial equilibrium impact

of trade agreements on trade flows.

On average, trade between parties starts increasing from the moment official negotiations have started. Then, trade flows get another boost when the EIA enters into force. Moreover, we find heterogeneous anticipation effects of EIAs on the different Member States of the EU and according to the depth of integration of the EIA, but not according to the pace of the negotiations.

The remainder of this chapter is organized as follows. Section 3.2 describes the different stages in the lifetime of an EIA, while section 3.3 provides an overview of the relevant literature. Section 3.4 discusses the gravity model and describes the empirical methodology used, while section 3.5 discusses the data. Section 3.6 presents the main findings and three extensions, and section 3.7 concludes.

3.2 The lifetime of an EU EIA

EU legislative processes are unique, given the extra supra-national level that has to be taken into account. This is also the case when negotiating trade agreements. Trade policy has been an exclusive power of the EU since the Treaty of Rome, meaning that the EU negotiates trade agreements rather than individual Member States (Putte, De Ville, and Orbie, 2015).

Since the entry into force of the Lisbon Treaty in 2009, trade policy is set down in Article 207 of the Treaty on the Functioning of the European Union (TFEU). Under this article, the Commission negotiates on behalf of Member States with third countries. The EU Council - comprising of the heads of state or government of the Member States - authorises the European Commission to start negotiations and sets out general objectives in a so-called "negotiating directive". Subsequently, the Commission negotiates on behalf of the EU and regularly informs the Council and the Parliament of how the negotiations are going. After each negotiation round and at other key points in the negotiations, the Council and the European Parliament are simultaneously informed about the state of play. The negotiating teams are lead by the Chief Negotiator of DG Trade, and the duration of the negotiations can range between two to three years to much longer, depending of how quickly the negotiations rounds follow one another (Bollen, De Ville, and Orbie, 2016; European Commission, 2015a).

When negotiations reach the stage of technical finalisation, the European Parliament and the Council are informed immediately and finalised texts are sent to the Member States and the European Parliament. After completion of the so-called legal "scrubbing" - which can take up to nine months, the chief negotiators of both parties initial the English text of the proposed agreements. At this point, the agreement is not yet legally binding (European Commission, 2015a; European Commission, 2015b).

Table 3.1: Definition of the different stages in the life of an EU EIA

Stage	Event	Description
Stage 1	Announcement	First mention of the potential agreement by a credible source
Stage 1	Mandate	EU Council gives the EU Commission a 'negotiation mandate'
Stage 2	Negotiation	Official start of negotiations
Stage 3	Conclusion	Official conclusion of negotiations
Stage 3	Initialling	Both parties initial the text of the proposed agreement
Stage 4	Signature	Agreement is formally/officially signed
Stage 5	Provisional	Provisional application of the agreement while awaiting ratification by all MS (if needed)
Stage 5	Publication	Publication of the agreement in the Official Journal of the EU
Stage 6	Implementation	Official entry into force of the agreement
Stage 7	End	Agreement is terminated or superseded by another agreement

Next, the agreement is translated into all official languages of the EU and the national language(s) of the partner country. Then, the Council gives the authorisation to sign the agreement, after an internal debate. Once both parties have signed, the Council transmits the agreement together with the draft decision to conclude to the European Parliament for consent. After consent of the Parliament, the Council adopts the final decision to conclude the agreement and the agreement is published in the Official Journal, after which it can enter into force (European Commission, 2015a).

Where the agreement contains provisions that fall under Member State responsibility, individual Member States also have to ratify the agreement according to their national ratification procedures. From the moment the EU has ratified these so-called "mixed agreements", they can be applied provisionally awaiting ratification by all Member States (European Commission, 2015a).

Based on this negotiation process, we can distinguish seven main events in the life of an EIA: (1) announcement, (2) start negotiations, (3) conclusion of negotiations, (4) signature of the agreement, (5) provisional application, (6) entry into force and (7) end of agreement.

3.3 Literature review

Though small, the body of evidence indicating potential anticipation effects of trade agreements is growing. We distinguish two strands in the literature. First, we give an overview of the empirical evidence that exists on (the

lack of) anticipation effects of EIAs. Then, we discuss theoretical models of trade that include forward-looking firms and study firm dynamics.

Empirical studies

Freund and McLaren (1999) were the first to find evidence of pre-implementation responses to trade liberalizations. Looking at countries joining regional trade blocs such as the EU and Mercosur, they find that the joining country's trade orientation toward bloc countries typically rises along an 'S'-shaped path, with the adjustment beginning four years before the date of accession. They attribute their findings to anticipatory sunk investments made to prepare for accession. In the case of NAFTA, Kose, Towe, and Meredith (2004) show that there were trade and financial flow effects of NAFTA before it entered into force. Krueger (1999) also finds that trade relations between Canada, the US and Mexico were affected before NAFTA entered into force. However, according to Krueger, this was not entirely attributable to the anticipation of NAFTA but also to the Mexican liberalisation process prior to NAFTA.

Magee (2008) studies yearly dynamics of different types of EIAs for a panel data set of 133 countries between 1980 and 1998. By augmenting a gravity model with yearly leads and lags, he finds that EIAs increase trade flows on average with 26% in the four years before entry into force. This is mainly driven by FTAs (which increase trade flows with a little more than 40% prior to entry into force) and to a lesser extent by CUs (almost 20%). He does not find any anticipation effects of PTAs. Using a similar strategy as Magee (2008), Bergin and Lin (2012) study the dynamics of trade before and after the implementation of the European Monetary Union (EMU). Using data for the period 1973-2004, they find that the extensive margin of trade rises seven years before the actual EMU adoption, while total trade flows start rising four years prior to the event.

Coulibaly (2009) studies trade effects of seven regional trade blocs in Sub-Saharan Africa, Asia and Latin-America between 1960 and 1999. Using a gravity model combined with kernel estimation techniques to capture non-monotic trade effects while imposing minimal structure on the data, he estimates the year-by-year impact of each trade bloc on trade flows. He finds anticipation effects of various strength five years prior to entry into force for ASEAN, ECOWAS and SADC, but not for AFTA, SAPTA, CACM, CAN and Mercosur.

Florensa, Márquez-Ramos, and Recalde (2015) study the effect of the institutional quality of EIAs on Latin America's total trade flows and the margins of trade. They use data on the bilateral exports of goods from 11 member countries of the Latin American Integration Association (LAIA) over the period 1962-2009. They find that LAIA countries anticipate trade

agreements 5 years before their entry into force. This is especially the case for the extensive margin of "deeper" trade agreements such as FTAs and CUs.

Lakatos and Nilsson (2015) study the trade effects of the EU-South Korea FTA. They use monthly trade data between the EU and South Korea for the period January 2005-June 2014 and find clear anticipation effects for EU exporters. Compared to the pre-negotiation period, the probability for EU countries to export to South Korea increases with 8% during the negotiation period. South Korean exporters tend to be more hesitant, with an anticipation effect of 6% only occurring after the initialling of the agreement. They find a similar picture when looking at the intensive margin.

Mölders and Volz (2011) is the only study looking at a multitude of EIAs that links trade data to the different stages in the lifetime of an EIA. Using data for 14 East Asian countries and 78 countries in the rest of the world for the period 1995-2007, they estimate a gravity model augmented with dummies reflecting five different stages of EIAs. Their results indicate that there are indeed anticipation effects of Asian FTAs. Particularly the stage in which bilateral trade agreements are (close to) being negotiated exposes significant positive trade effects. However, their results also clearly show that the magnitude and sign of the estimates depend very strongly on the econometric specification used. This indicates the need for follow-up research to confirm the robustness of their results.

Peterson and Rudloff (2015) study the link between trade and peace. Using data for 180 PTAs for the period 1957-2000, they find evidence of anticipation effects of PTAs on peace: while in-force PTAs have no statistically significant impact on peace when controlling for other factors linked to peace, signed but not-yet-in-force PTAs are pacifying. They argue that "a signed PTA indicates that all members to the agreement fully expect ratification and entry into force to follow. (...) The high likelihood of signed PTAs to enter into force is further strengthened by the fact that many PTAs have been ratified despite significant changes in leadership."

Theoretical framework

Most theoretical papers modeling the effects of trade agreements have focused on capturing how changes in the extent of globalization (such as trade agreements) influence various firm-level responses (i.e. export decisions, quality and organization of production). In order to highlight composition effects, the majority of these models examine cases in which the firms' responses do not change over time, assuming a stable environment without firm dynamics (see for example Krugman, 1980; Melitz, 2003; Chaney, 2008). Boosted by recent empirical evidence exploiting the availability of

firm-level data allowing researchers to explore the intertemporal dimension of firms' exports (e.g. Bernard, Redding, and Schott, 2010; Eaton et al., 2009; Iacovone and Javorcik, 2010), theoretical models allowing for the inclusion and study of firm dynamics have emerged.

For example, Arkolakis (2011) and Impullitti, Irarrazabal, and Opromolla (2013) extend the Melitz (2003) model to a dynamic setting, while Eaton et al. (2009) develop a model capturing the search and learning processes firms go through when (potentially) entering foreign markets. Arkolakis (2008) introduces trade dynamics into a static model of international trade with product differentiation, heterogeneous productivity firms, and increasing marginal market penetration costs.

With respect to changes in the trade policy environment, Alessandria and Choi (2014) and Ruhl (2008) examine transition dynamics of firms following a temporary or permanent trade liberalization, focusing on the role of entry into domestic and export markets. Three papers look at the dynamic effects of expected trade liberalization *before* they have happened, namely Burstein and Melitz (2011), Bergin and Lin (2012), and Costantini and Melitz (2008). We look at each more in detail in the following sections.

Burstein and Melitz (2011) model how the interaction between firm-level dynamics and endogenous innovation leads to transition dynamics at the aggregate level in response to a trade liberalization. They analyze the transition dynamics of aggregate productivity, consumption and trade volumes under different liberalization scenarios. Their model is a 2-country model under monopolistic competition with a single factor of production (labour) and common CES product differentiation across all products. Firms are heterogeneous with respect to their export and innovation decisions, and productivity is a function of innovation. Firms pay a sunk cost to start exporting, in addition to per-unit iceberg costs and per-period fixed costs of trading. They are forward looking and there is a feedback loop between all the decisions the firm takes.

They then analyze the effects of a reduction in international per-unit trade costs of 3.5%. First, they consider the importance of interaction effects between firm-level dynamics and endogenous innovation in generating transition dynamics by juxtaposing the effects of a permanent unanticipated trade liberalization in the full model, with the effects of the same liberalization on either a model where productivity remains constant post-entry (i.e. no innovation) or a model where there is no endogeneous market selection and all firms export regardless of their productivity (i.e. no fixed cost of exporting). In the latter two cases, trade liberalization does not induce any endogenous transition dynamics, whereas it does in the full model. This because of the response of firm entry to the change in trade cost and consequently the differences in current and future export-market profitability relative to the profitability of domestic sales. Second,

they analyze the effects of different trade liberalization scenarios: (1) an unanticipated permanent reduction of trade costs, (2) an unanticipated temporary reduction, (3) a permanent reduction of trade costs that was announced two years prior to the reduction, (4) an unanticipated temporary reduction when part of the fixed costs exporters face are sunk[1], (5) an unanticipated permanent reduction with sunk-export costs, and (6) an anticipated permanent reduction with sunk-export costs.

The results under the two scenarios in which the trade liberalization was announced two years ahead of time provide a useful framework for our paper. Burstein and Melitz (2011) find that firms anticipate trade liberalizations and change their behavior before the trade liberalization enters into force. Without sunk-export costs, exporters increase their innovation intensity the day the trade liberalization is announced. This is driven by the firms' desire to smooth their innovation activities over time in response to the higher benefits to innovate. Because the cost of innovation is convex, firms do not want to cluster their innovation activities immediately before the drop in the trade cost and prefer instead to spread them out ahead of the anticipated liberalization. The increase in innovation is then reflected in a higher growth rate for exporters, which results in an increasing share of exporters in domestic revenues and hence an increase in exports. Adding sunk-export costs to the model generates an option value associated with the export-entry decision and an associated hysterisis band. This induces firms to enter the export market before trade costs decrease, as the announcement of a future trade liberalization substantially reduces the option value of waiting to export for firms that are just below the export-cost cutoff in the pre-liberalization steady state. The increase in the share of exporters in domestic revenues, and hence trade volumes, before entry into force is substantially larger in the model with the sunk-export costs compared to the model without. While the relationship between time and trade volumes is S-shaped for both scenarios, with an acceleration in the growth of trade in the first two years after entry into force of the liberalization, the relationship is much smoother and gradual in the model with sunk-export costs compared to the model without.

The model of Bergin and Lin (2012) is closely related. They construct a trade model to understand the role of news and shifts in expectations about a future trade liberalization on firms responses. By allowing for heterogeneity in the sunk-export costs across firms, they make firms' entry decisions forward looking and responsive to the announcement of a trade liberalization. The mechanisms of early entry differ between both papers:

[1]The assumption Burstein and Melitz (2011) make is that in addition to the per-period fixed cost firms pay to export, non-exporters that become exporters must also hire a certain amount of units of labor during the first period as an exporter. An exporter that stops exporting must incur these sunk-export costs to restart exporting. Hence the export decision becomes (partly) irreversible.

while Burstein and Melitz (2011) results are based on the uncertainty of shocks leading to an option value of waiting to enter, Bergin and Lin (2012) mechanism of firm entry ahead of the actual liberalization is rooted in a congestion externality (i.e. the sunk cost of entry rises with the number of other firms entering). This captures the idea of the first-mover advantage as outlined in the International Business literature theoretically. The liberalization scenarios considered also differ: Bergin and Lin (2012) model their scenario to resemble the effect of the signing of the Maastricht Treaty in 1992, formalizing plans to adopt a common currency (the euro) seven years later in 1999, which lowered trade costs and frictions associated with currency conversion. They consider three changes in trade costs: a drop in iceberg costs from 0.2 to 0.1, a cut in the average level of sunk cost of exporting of 5% and a reduction of the fixed cost of trade by 5%. The trade liberalization is expected to be permanent under all three scenarios, and announced seven years ahead of time.

They find that the first scenario matches the actual transition dynamics they observed in the data the best, namely a 12% rise in exports between 1992 and 1999. Under the first scenario, the model predicts significant entry investment immediately in the period where the shock is announced, leading to a larger number of firms starting to export already in the second period. The response in overall exports differs from that of the number of firms exporting in that it does not rise significantly prior to the actual shock. This coincides with the empirical evidence reported earlier that the extensive margin responded to EMU several years ahead of overall exports. The reason is that while the extensive margin is driven mainly by sunk costs and forward looking behavior, the demand for imports is driven primarily by the relative price and hence by iceberg trade costs in that period.

What is interesting, is that they extend their model to allow for uncertainty. While Burstein and Melitz (2011) assume that agents have perfect foresight and that there is no aggregate policy uncertainty, Bergin and Lin (2012) relax this assumption and include uncertainty about the entry into force of the currency union into their model. They do this by making the model stochastic and including shocks that are independently normally distributed with zero mean. While the expected value of the reduction in trade costs remains the same, there is now uncertainty about the realized value of trade costs, as shocks make trade costs fluctuate around the mean.

They find that the level of exports is not affected by uncertainty. This because firms make the decision of price setting and exports after trade costs are actually realized for that period, thereby eliminating uncertainty for this decision. In contrast, the number of firms entering the export market is impacted by the uncertainty. As firms make the decision to enter prior to the realization of the trade costs, uncertainty about future trade costs implies risk associated with a new export entry decision. Nonetheless,

the effect of uncertainty on the extensive margin remains fairly small for moderate levels of uncertainty, and there is only a big effect of uncertainty on the export decision if the probability of trade costs actually falling at entry into force drops below 60%.

Finally, Costantini and Melitz (2008) build a dynamic model of firm-level adjustment to trade liberalization that captures the joint entry, exit, export and innovation decisions of heterogeneous firms. They model the sunk nature of market entry costs for both the domestic and export market as well as the per-unit and additional fixed costs of exporting incurred in every period. Again, they analyze different trade liberalization scenarios. Focusing on changes in firm productivity and innovation decisions, they show how the relative timing and magnitude of firm-level productivity improvements and export market entry decisions are also determined by non-technological factors such as the timing of trade liberalization announcements and the speed of liberalization. They find that announcing the trade liberalization before its implementation, induces firms to anticipate the liberalization and innovate ahead of the export market entry. They also show that a more abrupt pace of liberalization amplifies these effects.

Based on the predictions of these three models, we expect to find positive anticipation effects of EU trade agreements on trade flows between the EU and partner countries. We also expect the anticipation effects to be smaller than the effect of the EIA on trade flows once it enters into force. Yet, it is difficult to predict at which stage anticipation effects will occur based on these models, as these theoretical models do not distinguish between different stages in the lifetime of an EIA before it enters into force. Rather, they assume one stage between announcement of the EIA and its entry into force and model the anticipation effect as one event.

3.4 Methodology

The main point of this paper is to link the anticipation and reaction effects of EIAs to the different stages in the life of an EIA. To do so, we augment a gravity model with a dummy for each stage.

Based on the negotiation process of European EIAs described in section 3.2, we distinguish seven stages in the life of an EIA: (1) announcement, (2) negotiations, (3) conclusion of negotiations, (4) agreement signed, (5) provisional application, (6) entry into force and (7) end of agreement.

As has been shown extensively in the literature, it is necessary to account for the multilateral resistance term when using the gravity model, as well as the endogeneity of EIAs. We use the same methodological strategy as in chapter 2 to deal with these potential sources of bias, that is we include three sets of fixed effects in our model (importer-year, exporter-year and

pair), and alternatively we take first differences using four year intervals and estimating the model without country pair fixed effects.

Moreover, we have shown in the previous chapter that deeper trade agreements have different effects on trade flows than more shallow agreements. We therefore also allow for a heterogeneous impact of different types of EIAs in this chapter. We do this by interacting our $STAGE$ variable with a variable indicating whether the EIA is a TWPTA, FTA or CU/EM.

This results in the following baseline model:

$$lnX_{ijt} = \beta_0 + I_{ijt}^{EIA} * \sum_{s=1}^{7} \beta_s STAGE_{ijt}^{s} + \delta_{it} + \psi_{jt} + \eta_{ij} + \varepsilon_{ijt} \qquad (3.1)$$

with X_{ijt} bilateral import and export flows, $STAGE_{ijt}^{s}$ a dummy variable taking the value 1 when countries i and j have an EIA in stage s in year t, I_{ijt}^{EIA} indicating whether the EIA is a TWPTA, FTA or CU/EM, δ_{it} and ψ_{jt} country-year fixed effects, η_{ij} country pair fixed effect, ε_{ijt} error term.

In a second part, we extend our baseline model. First, we exploit our *ex post* knowledge that some trade agreements and negotiations have been suspended. We explore whether trade agreements that were actually implemented have differential anticipation effects than trade negotiations for agreements that were never finalized. We do this by interacting our main independent variables with a dummy for suspended negotiation and suspended trade agreement, respectively. We also add a dummy for EIAs that have not been finalized yet and for which we hence don't know if they will be suspended at some point or not.

We estimate the following model:

$$lnX_{ijt} = \beta_0 + I_{ij}^{susp} * \sum_{s=1}^{7} \beta_s STAGE_{ijt}^{s} + \delta_{it} + \psi_{jt} + \eta_{ij} + \varepsilon_{ijt} \qquad (3.2)$$

with I_{ij}^{susp} indicating whether the negotiations of an EIA have been suspended at some point, the EIA itself (after ratification) has been suspended or if the EIA has not been through all stages yet.

Second, we investigate whether the degree of certainty that the trade agreement will eventually be implemented has an impact on anticipation effects. We proxy the degree of certainty by the duration of the different stages. As the speed of negotiations will likely be different when there is one or more partner countries, we also add a dummy variable indicating whether an EIA is being negotiated bilaterally or multilaterally [2].

We estimate the following model:

$$lnX_{ijt} = \beta_0 + \sum_{s=1}^{7} \beta_s STAGE_{ijt}^{s} + speed_{ijt} + I_{ij}^{multi} + \delta_{it} + \psi_{jt} + \eta_{ij} + \varepsilon_{ijt} \qquad (3.3)$$

[2] As the EU negotiates trade policy as a whole, we treat it as one entity and consider EIAs between the EU and one partner country as bilateral.

with I_{ij}^{multi} a dummy variable taking the value 1 when there is more than one partner country and $speed_{ijt}$ a variable indicating how long the negotiation process took.

Third, we explore whether trade agreements have heterogeneous effects on the Member States. We follow a similar method as outlined in Soete and Van Hove (2017) and estimate a Member State-specific coefficient for each stage by interacting our $STAGE$ variable with a dummy for each Member State. Our specification takes the following form:

$$lnX_{ijt} = \beta_0 + I^{MS} * \sum_{s=1}^{7} \beta_s STAGE_{ijt}^{s} + \delta_{it} + \psi_{jt} + \eta_{ij} + \varepsilon_{ijt} \qquad (3.4)$$

with I^{MS} a dummy for each Member State of the European Union. As Soete and Van Hove (2017) have shown that EIAs have heterogeneous effects on the different EU Member States once the EIA enters into force, we also expect these Member States to anticipate trade agreements differently.

3.5 Data

The data used in this paper is based on the dataset of the previous chapter, described in section 2.3. Hence, it covers bilateral import and export flows between the 27 Member States of the European Union and the rest of the world (201 countries and territories) from 1988 through 2013[3]. We focus on the European Union, as the EU has been a driver of the recent explosion of EIAs (see chapter 1).

As this dataset only provides data on provisional application and entry into force of EIAs (stage 5 and 6), we complemented this dataset with data on the other stages in the lifetime of an EIA. For stages (1) through (4), we used European Commission (2014). In the few cases where we could not find the data using official EU or partner country sources, we used historical data from quality newspapers through LexisNexis Academic (2014). We include all stages of all EIAs in our dataset that we could find, so not only EIAs that eventually enter into force. Hence our dataset also contains information on trade agreements that were never implemented or EIAs for which the negotiation talks were suspended.

Summary statistics on the different stages of the lifetime of European EIAs are provided in tables 3.2 and 3.3. The majority of EIAs in our dataset are OPTAs, TWPTAs and FTAs. The frequency of customs unions

[3]As noted in the previous chapter, the dataset considers Belgium and Luxembourg, and Liechtenstein and Switzerland as one country. So when we refer to Belgium or Switzerland in this paper, we really mean Belgium and Luxembourg, and Switzerland and Liechtenstein. Moreover, we do not include Croatia in our sample, as Croatia became a member of the EU in mid 2013.

Table 3.2: Summary statistics on stages of EIAs.

EIA / Stage	**TWPTA**		**FTA**		**CU**		**Subtotal**	
	Freq	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
Stage 1	5 012	6.6%	5 915	7.8%	242	0.3%	11 169	**15%**
Stage 2	16 213	21.4%	12 319	16.2%	0	0.0%	28 532	**38%**
Stage 3	1 631	2.2%	1 897	2.5%	0	0.0%	3 528	**5%**
Stage 4	710	0.9%	1 275	1.7%	175	0.2%	2 160	**3%**
Stage 5	2 630	3.5%	2 105	2.8%	0	0.0%	4 735	**6%**
Stage 6	3 658	4.8%	16 190	21.3%	4 391	5.8%	24 239	**32%**
Stage 7	132	0.2%	1 351	1.8%	0	0.0%	1 483	**2%**
Subtotal	**29 986**	**40%**	**41 052**	**54%**	**4 808**	**6%**	**75 846**	**100%**

Note: The dataset consists of 169 782 observations in total, of which 43 587 observations have no EIAs, and 50 349 have an active OPTA.

Table 3.3: Summary statistics on the duration (in years) of the stages of EIAs.

	All		**TWPTA**		**FTA**	
	Mean	Stdev	Mean	Stdev	Mean	Stdev
Stage 1	1.7	1.5	3.1	1.3	0.9	0.9
Stage 2	4.0	3.6	7.1	1.3	2.2	4.1
Stage 3	0.6	0.9	0.8	0.7	0.5	1.1
Stage 4	1.0	0.9	2.2	0.7	0.8	1.3
Stage 5	3.0	2.4	6.7	1.5	2.0	0.8
Stage 4 and 5	1.2	1.4	0.6	1.3	1.3	1.6

Note: there are not enough observations for CUs to compute sensible summary statistics.

in our dataset is very low, as the European Union has only concluded CUs with a handful of countries. Moreover, most of these CUs already entered into force before 1988, explaining the very low percentage of stage 1 through 5 CUs in our dataset. There are no agreements that come to an end in our dataset. But there are, however, some trade agreements that are superseded by an agreement with deeper integration.

We assume that OPTAs have no anticipation effects, as the implementation of these trade agreements is a unilateral decision, and it is often not very certain on forehand for which countries they will be implemented or how cumbersome it will be for companies to comply with all the rules to get preferential treatment.

Looking at the duration of the different stages of EIAs, we find that the negotiation stage (stage 2-3) has the longest duration, with an average duration of four years and a standard deviation of 3.6 years. Agreements that are applied provisionally (stage 5-6), are on average applied provisionally for 3 years, with a standard deviation of 2.4 years. All other stages in the lifetime of an EIA (with the exception of the entry into force of course) have an average duration of less than two years. When we split up these numbers

according to EIA type, we find that the whole pre-implementation process of TWPTAs takes in general more than double the time of that of FTAs. Standard deviations are also much higher for this type of agreements.

3.6 Estimation strategy and results

This section presents our results. We start by presenting results for the baseline model. Then we present two robustness checks and finally we extend our baseline model in three different ways. In a first extension, we investigate whether trade agreements/negotiations that have been suspended, have a differential impact on trade flows than trade agreements that had a smooth negotiation process. In a second extension, we evaluate whether the speed of negotiations influences the impact on trade flows. Finally, we explore whether the Member States of the European Union anticipate trade agreements differently.

Baseline model

Results using the same estimation methods as in the previous chapter are presented in table 3.9 in appendix. However, looking at the residual versus fitted value plots of the fixed effects and fourth differences specification in figure 3.6 in the appendix, we see that using robust standard errors clustered on country pair do not control sufficiently for the serial correlation present in the data. The residuals are not randomly distributed around the 0 line, and there is a clear pattern in the variance of the residuals. We confirm this finding using the Wooldridge test for autocorrelation in panel data, which strongly rejects the null hypothesis of no AR(1) processes in the data ($F=589.9$, $p<0.000$).

To control better for the severe serial correlation and heteroskedasticity present in the data, we use feasible generalised least squares (FGLS) using an AR(1) autocorrelation structure. GLS was first described in Aitken (1934) and can be used to perform linear regression when there is a certain degree of correlation between the residuals in a regression model. In these cases, ordinary least squares is no longer the best linear unbiased estimator (BLUE), as it can be statistically inefficient or even give misleading inferences. For large samples FGLS is consistent and efficient under heteroskedasticity and autocorrelation, and should hence be preferred over OLS. This because FGLS is estimated in two stages, with the residuals of the first stage being used to build a consistent estimator of the errors covariance matrix by re-weighting the data (Baltagi, 2008, Greene (2003)).

To reduce the number of parameters we need to estimate, we demean our data and then estimate our baseline model without country pair fixed effects using FGLS.

Hence, this is the exact model we are estimating:

$$(x_{ijt} - \overline{x}_{ij}) = \sum_{s=1}^{7} \beta_s \left(STAGE^s_{ijt} - \overline{STAGE}^s_{ij} \right) + \left(\delta_{it} - \overline{\delta}_i \right) + \left(\psi_{jt} - \overline{\psi}_j \right) + (\varepsilon_{ijt} - \overline{\varepsilon}_{ijt}) \quad (3.5)$$

with x denoting ln X or the log of bilateral export flows and import flows.

Results are presented in figure 3.1. Note that due to the small number or even lack of observations for certain stages of customs unions and deeper integration agreements, we cannot estimate the anticipation effects for all stages of these agreements. We do not find any evidence that TWPTAs or CUs create trade before they enter into force. For CUs, none of coefficients for the different stages before implementation reaches statistical significance for CUs, while for TWPTAs we find a small decrease in trade flows during the negotiation, signature and implementation stage. Negative and significant effects of the entry into force of shallow agreements on trade flows are also found in Baier, Bergstrand, and Feng (2014), Florensa et al. (2013), Florensa et al. (2014), and Márquez-Ramos, Florensa, and Recalde (2015). Both Baier, Bergstrand, and Feng (2014) and Márquez-Ramos, Florensa, and Recalde (2015) explain this finding by the occurrence of a differential trend over time, biasing the results for shallow agreements downwards.

For FTAs, on the other hand, we find large anticipation effects. We find that trade between parties starts increasing from the moment official FTA negotiations have started. We find that trade increases with 21% during the negotiations. Trade flows get another boost when the FTA enters into force (+36% compared to country pairs without EIA). When FTAs are officially announced, we also find a statistically significant effect on trade flows, however the effect is very small in economic terms (+10%).

Results grouping FTAs and CUs together into one dummy variable yield very similar results and are presented in table 3.6 in the appendix.

Comparing these results to the results of Baier and Bergstrand (2007), who find that EIAs increase trade flows up to 100% between the time they enter into force and 10 years after the entry into force, we can conclude that these effects are rather modest, but not negligible.

The results are also consistent with the theoretical predictions of Burstein and Melitz (2011). In their model, they include two stages of trade liberalization: announcement and entry into force. Allowing for productivity dynamics, Burstein and Melitz find that when a trade liberalization is announced on forehand, some exporters enter the market ahead of time at the moment of the announcement. This is a sudden and one-time increase. However, between the announcement and the entry into force of the trade liberalization, the volume of exports (measured as the share of exporters in domestic revenues) increases steadily.

To get a full picture of the effects of trade agreements over time, before *and* after entry into force, we follow a similar strategy as in chapter two

Figure 3.1: Anticipation effects of EIAs according to type of EIA.

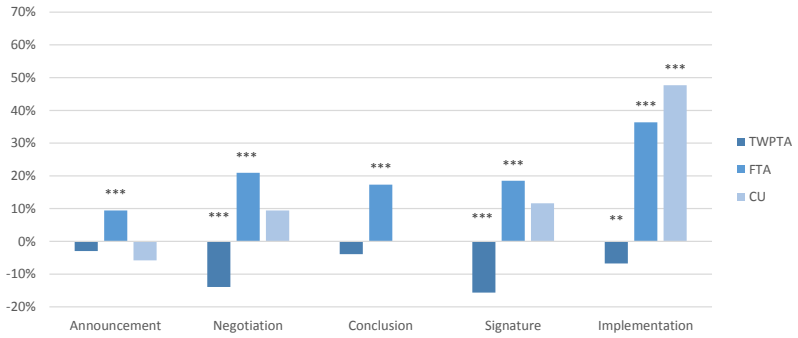
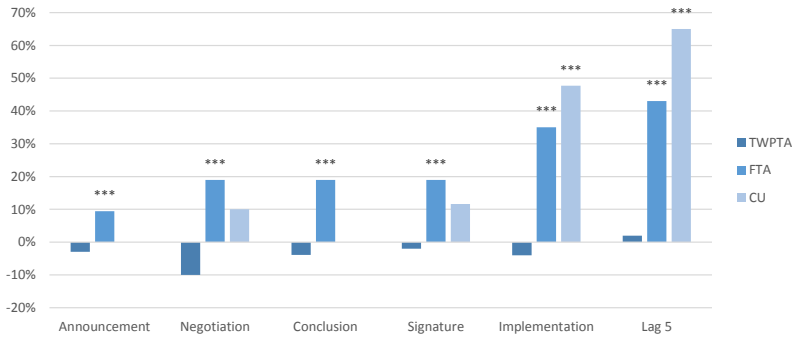


Figure 3.2: Anticipation and lagged effects of EIAs according to type of EIA.



and add five-year lags into our baseline model[4]. Results are presented in figure 3.2[5]. We find that trade keeps increasing (at least) up to five years after the implementation of the agreement. After five years, trade flows are on average 43% higher for FTAs and 65% for CUs.

[4]It would be interesting to see the results over a longer period of time. However, adding ten-year lags into our model makes us loose 10 years of data. This big loss of data results in unstable results.

[5]Note that the interpretation of lagged effects is slightly different than for the stage-dummies: while the dummies for every stage represent the total effect on the trade flows at that point in time, the lagged effect is the additional effect after five years. To make the figure easily interpretable, we therefore compute the total effects of trade agreements on trade flows after five years by adding up the coefficient of the lagged effect with the coefficient for the implementation stage. To obtain standard errors of this total average treatment effect we compute a two-tailed joint significance test.

Robustness

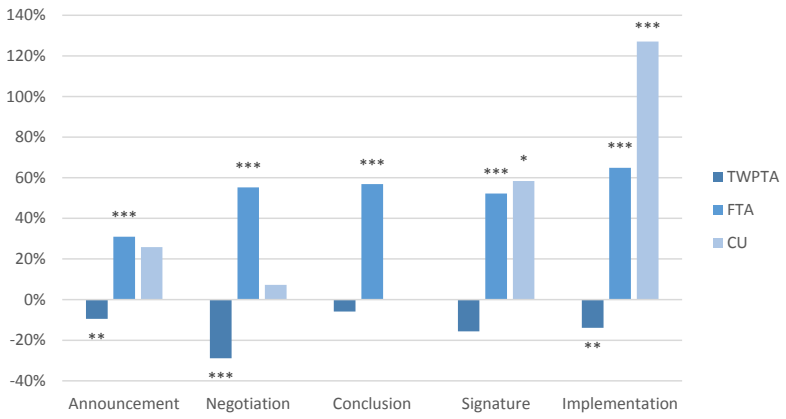
Endogeneity. Generalised least squares (GLS) assumes strict exogeneity. If this assumption fails, the estimation will be biased. To test for strict exogeneity, Wooldridge (2010) suggests including leads of the EIA variables in levels in the estimation. If the EIA variables are exogenous, the coefficients for these leads should not be statistically significant. Results for the equation test are presented in table 3.7. We find that the 5 year lead is not statistically significant, hence indicating our estimation strategy controls effectively for the potential endogeneity of EIAs.

EU integration. To rule out any effects of EU integration on our findings, we estimate our model using only EU12 countries as a robustness check. These countries were part of the European Union for the whole period of our study, and there should hence not be any EU integration effects.

Results are presented in figure 3.3 and in table 3.6 in the appendix. We find that TWPTAs have no or slightly negative effects on trade flows of the EU12 countries during every stage of their lifetime. CUs have no effect on trade flows during the announcement and negotiation stage, while they boost trade flows strongly after they are signed and even more once they are implemented. FTAs increase trade flows from the moment they are announced. Once the negotiation starts, trade flows increase even more and this effect lasts until after the implementation of the trade agreement.

Comparing these results to the results using our full sample, we find that the results are very similar qualitatively. Quantitatively, the magnitude of the results is larger, with FTAs increasing trade flows with 55% during the negotiation phase, 57% during the conclusion phase, 52% during the signature phase, and 65% after (provisional) entry into force.

Figure 3.3: Anticipation effects of EIAs according to type of EIA for EU12 countries only



Extensions

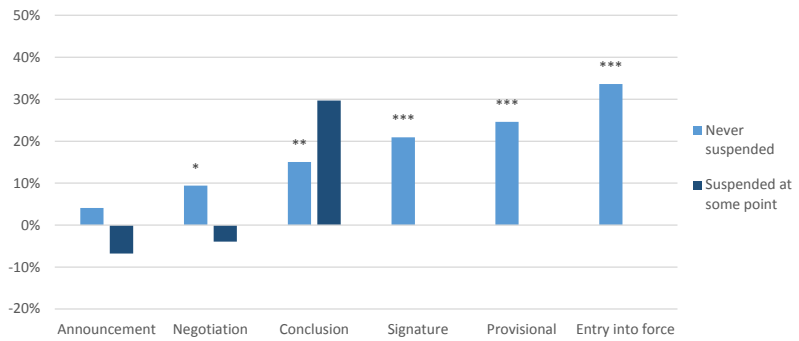
Suspended. In this first extension, we exploit our *ex post* knowledge that some trade negotiations have been suspended. Trade negotiations that will eventually be suspended, might proceed differently - maybe less smoothly, or the press might be more critical - than trade negotiations that will not. By interacting our dummies for the different stages with a dummy for suspension, we can compare the effects of both. As the baseline model revealed that TWPTAs do not have any anticipation effects, we only include FTAs and CUs in our model. For the rest, we use the same estimation strategy as for the baseline model.

Results are presented in figure 3.4. The full regression output can be found in table 3.10 in the appendix. Note that in our dataset, there are six trade agreements that were suspended while they were in stage 1 of the pre-implementation process, twelve in stage 2 and three in stage 3. None of the trade agreements that were already signed have been suspended. Hence stages 4 through 6 are omitted from the estimation for the trade agreements that were suspended at some point. All trade agreements that were suspended are FTAs, no CUs were suspended.

We find that FTAs that were suspended, have no statistically significant effect on trade flows at any point in their lifetime. The coefficients for the first and second stage (announcement and negotiation) are close to zero, while the coefficient for the conclusion stage amounts to 0.26, but is not statistically significant at 10%. Moreover, when adding a dummy capturing the three years after the suspension of an agreement, we find that trade flows are as we expect them to be based on the variables in our model (see column (2) of table 3.10 in appendix). We thus find no effect of trade agreements that are suspended at some point on trade flows.

This suggests that firms seem to be able to distinguish *a priori* between trade agreements that will enter into force eventually and those that will not, or that the announcement or the start of negotiations of some agreements

Figure 3.4: Anticipation effects of FTAs and CUs.



is not a credible signal that the agreement will eventually enter into force, while of others it is. Looking more in detail at the proposed EIAs that have been suspended, we find that the majority of suspended trade deals were with members of four trade blocs, namely the Association of Southeast Asian Nations (ASEAN, with member states Brunei, Indonesia, Malaysia, Philippines, Singapore, Thailand, Vietnam, Laos, Myanmar and Cambodia), the Andean Community (with member states Bolivia, Colombia, Ecuador and Peru), Mercosur (Argentina, Brazil, Paraguay, and Uruguay) and the Gulf Cooperation Council (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the UAE). Woolcocke (2007) sees some similarities between the EU FTA negotiations with Mercosur, on the one hand, and ASEAN, on the other hand. Namely, both regions include countries at different levels of development and are experiencing difficulties with their regional integration process. This makes it difficult for the EU to pursue a region-to-region approach. Similar comments can also be made for the Gulf Cooperation Council and the Andean Community, which were not at all advanced in their own integration process at the time of the EU FTA negotiations.

Speed. In a second part, we investigate whether the speed of negotiations influences the anticipation effects of trade agreements. Croce, Juan-Ramòn, and Zhu (2004) argue that anticipation depends strongly on the belief that the agreement will be implemented. Hence smooth or fast-paced negotiations might increase the probability of an EIA being concluded. We explore this by including a variable with the speed (duration in years) of the negotiation process in our baseline model. We again use the same estimation strategy for this extension as for the baseline model, except for only including FTAs and CUs.

Results are presented in table 3.4. Column (1) presents the baseline model, augmented with the duration of stages 1 to 6 for each FTA and CU. In column (2) we use the duration of stages 1 to 4, while in column (3) we include an interaction term. Finally, column (4) includes the speed of each stage separately. All specifications also include a dummy variable indicating whether an EIA is being negotiated bilaterally or multilaterally.

We find that the pace of the negotiations does not influence whether or not trade agreements are anticipated. None of the coefficients for speed in the different specifications are statistically nor economically significant.

Member States. In this final extension, we explore whether there is heterogeneity between Member States of the European Union in anticipating trade agreements. We do this by estimating a Member State-specific effect of EIAs on each stage in the lifetime of an EIA. We expect to find heterogeneity, as Soete and Van Hove (2017) have shown that there is heterogeneity in the reaction of Member States to trade agreements after their entry into force. It is reasonable to assume that the determinants influencing heterogeneity in the reaction of Member States to the entry into force of EIAs will also induce heterogeneity in how Member States anticipate trade agreements.

Results are presented in figure 3.5. The full regression output can be retrieved upon request. We find clear evidence of heterogeneity between

Table 3.4: Anticipation effects of FTAs and CUs and the pace of negotiations.

	(1) Trade	(2) Trade	(3) Trade	(4) Trade
Stage 1	0.09	0.08	0.09	0.09
	(0.093)	(0.059)	(0.093)	(0.093)
Stage 2	0.30***	0.09	0.30***	0.32***
	(0.091)	(0.059)	(0.091)	(0.091)
Stage 3	0.28**	0.18**	0.28**	0.30***
	(0.116)	(0.073)	(0.116)	(0.116)
Stage 4	0.30***	0.24***	0.30***	0.32***
	(0.109)	(0.078)	(0.109)	(0.108)
Stage 5	0.27***	0.29***	0.27***	
	(0.101)	(0.073)	(0.101)	
Stage 5 and 6				0.46***
				(0.067)
Stage 6	0.46***	0.44***	0.46***	
	(0.067)	(0.064)	(0.067)	
Multi	0.00	0.01	0.01	0.02
	(0.019)	(0.018)	(0.020)	(0.020)
Multi*speed 1-6			-0.00	
			(0.019)	
Speed 1-6	-0.01		-0.00	
	(0.004)		(0.004)	
Speed 1-4		-0.00		
		(0.004)		
Speed 1-2				0.01
				(0.023)
Speed 2-3				0.00
				(0.019)
Speed 3-4				-0.02
				(0.038)
Speed 4-6				-0.02
				(0.016)
Observations	71,651	77,737	71,651	71,651

Standard errors in parentheses. * p<0.1, ** p<0.05 and *** p<0.01.

Member States. While in some Member States trade flows double during the negotiations phase, this is not the case in others. Some Member States even experience a decrease in their trade. We find strong positive anticipation effects for Belgium, Ireland, the Netherlands, Portugal, Spain, Latvia, Romania and Bulgaria. With the exception of Bulgaria, anticipation effects of trade agreements are more important for all these countries than the impact of trade agreements after their entry into force. This finding demonstrates how important it is to take anticipation effects into account when one wants to estimate the total partial equilibrium impact of trade agreements on trade flows.

Export promotion policies have been shown to stimulate exports (Görg, Henry, and Strobl, 2008; Volpe Martincus and Carballo, 2008) and increase the propensity to export (Schminke and Van Biesebroeck, 2013). Moreover, for the case of Belgium, it has been shown that trade export promotion is especially important and effective in reaching destinations outside of the Single Market (Schminke and Van Biesebroeck, 2013). To test whether trade openness or export promotion policies are related to the diverging anticipation effects in the different Member States, we calculate the correlation between the anticipation effects and trade openness, on the one hand, and two measures of trade promotion, on the other hand. Results are presented in table 3.5. Trade openness was calculated as the sum of exports and imports of a country divided by its GDP and was retrieved from the World Bank. Using either trade openness from 1995 or 2013, we find that there is no relationship between trade openness and anticipation of trade agreements. The correlation coefficients amount to -0.05 and -0.07, respectively. There is a weak negative correlation, however, between trade openness and anticipation effects during the first two stages of an EIA, with coefficients ranging between -0.20 and -0.26. Being less open to trade is associated with more positive (or less negative) anticipation effects during the announcement and negotiation phase of a trade agreement.

Trade promotion was measured as the number of staff employed by a country to promote trade or the number of clients trade promotion agencies have. This data comes from INTRACEN (2015). We find a modest correlation between the number of clients and anticipation of a trade agreement (0.34 on average for all stages), while we find a weak correlation between the number of clients and the effect of a trade agreement once it has been implemented (0.18). Moreover, looking at the correlation coefficients for all pre-implementation stages separately, we find that the correlation coefficients are the largest in the two first stages: stage 1 has a correlation coefficient of 0.36 while for stage 2 it amounts to 0.43. This could suggest that trade promotion agencies are important in signaling to firms the existence of trade agreements and their potential opportunities in the early stages of development of trade agreements, when they might not have received much attention or media coverage. We also find a weak association between the number of staff employed by trade promotion agencies and the anticipation effects during the announcement stage of an EIA (the correlation coefficient is 0.19).

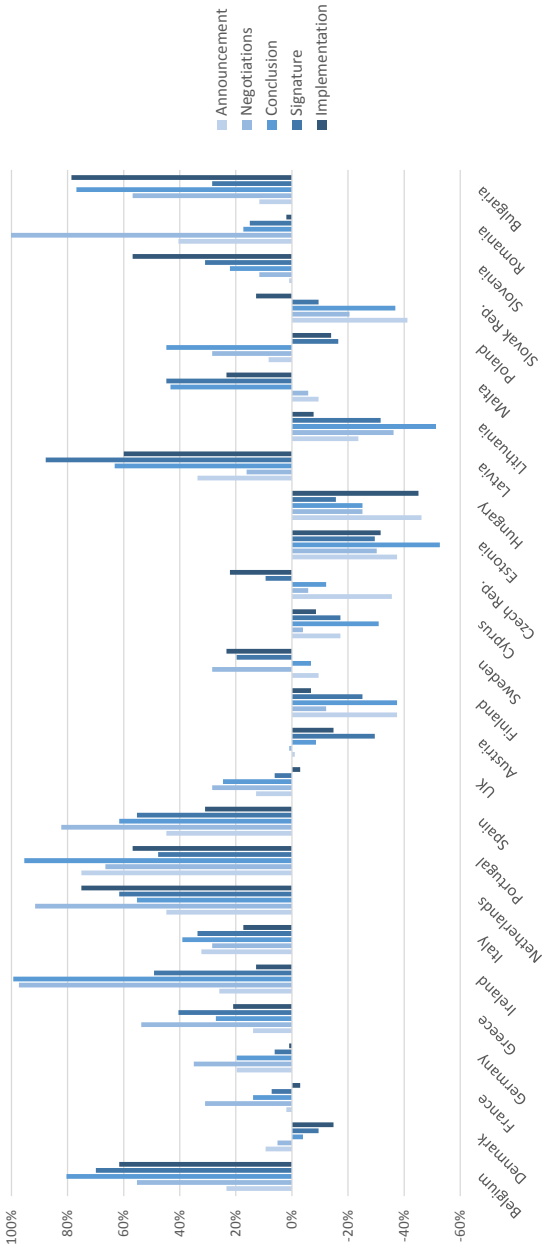


Figure 3.5: Anticipation effects of FTAs and CUs by Member State.

Table 3.5: Explanations for the heterogeneity of anticipation effect by member state

	Trade Openness		Trade Promotion	
	1995	2013	Nr of staff	Nr of clients
Stage 1	-0.23	-0.26	0.19	0.36
Stage 2	-0.20	-0.20	0.11	0.43
Stage 3	0.08	0.03	0.04	0.23
Stage 4	0.14	0.13	-0.12	0.20
Mean stages 1-4	-0.05	-0.07	0.06	0.34
Stage 5 and 6	0.08	0.11	-0.19	0.18

3.7 Conclusion

This paper looks more closely at the different stages of the lifetime of an EIA and estimates the impact each stage has on trade. We do this by augmenting the gravity model with a dummy for each stage in the lifetime of an EIA. We use a panel on aggregate trade flows between 27 EU countries and 201 third countries and territories for the period of 1988-2013, and control for endogeneity of EIAs and multilateral resistance.

Our results clearly indicate the existence of anticipation effects, but the presence and strength of anticipation effects depend on the depth of integration. We find that TWPTAs and CUs have no anticipation effects, while FTAs have large anticipation effects: trade between parties starts increasing from the moment official FTA negotiations have started and keeps increasing up to five years after the entry into force of the trade agreement.

The anticipation effects of FTAs are sizeable and much more important than the literature has assumed them to be so far: FTAs increase trade flows on average with 21% during the pre-implementation period. Once the FTA enters into force, trade flows get another boost of 15 percentage points and are on average 36% higher than trade flows between country pairs without an FTA. Five years after the entry into force of the agreement trade flows are on average 43% higher. Half of the increase in trade flows ascribed to trade agreements thus takes place *before* said trade agreements have officially entered into force.

Moreover, comparing our results to chapter 1[6], we find that not including all the stages of the lifetime of an EIA into the model underestimates the effects trade agreements have: while FTAs are estimated to increase trade flows with 36% when including all stages, this is only 22% when only including a dummy for entry force. We obtain similar findings when looking at the effects up to five years after entry force. To obtain correct estimates of the effects of trade agreements on trade flows it is therefore important to

[6]The findings of chapter 1 and 2 were obtained using the same datasets and using similar methods, making the results comparable.

look at the whole lifetime of the trade agreement, instead of only looking at the effect of trade agreements after they enter into force.

One possible channel through which governments could stimulate anticipation effects are trade promotion agencies. We find that the heterogeneity in anticipation effects of trade agreements between EU Member States can be explained (partially) by the presence of trade promotion agencies: countries with active trade promotion agencies experience a higher increase in trade flows before trade agreements enter into force. This suggests that these agencies might be important in signaling the existence of trade agreements and their potential opportunities to firms. Moreover, the correlation between the presence of trade promotion agencies and the trade stimulating effects of trade agreements decreases over time. The correlation is much stronger in the early stages in the life of an EIA compared to the later stages. This might be because of the first-mover advantage providing early entrants with a competitive edge over later entrants. Trade promotion agencies should therefore focus their efforts on the announcement and negotiation stages of EIAs for the biggest results.

However, trade negotiations have to be credible for anticipation effects to occur. Trade negotiations with trade blocs that encounter difficulties with their own integration process did not result in elevated trade flows.

While this paper allows for heterogeneous effects of trade agreements on the different EU Member States, we do not allow for many other sources of heterogeneity, leaving many questions unanswered. Are the anticipation effects driven by the intensive or the extensive margin of trade? How is firm entry affected? Which characteristics of trade agreements drive anticipation effects? And how does media coverage and political uncertainty affect the anticipation of trade agreements? In the next chapter, we will complement this study of anticipation effects on the aggregate level with an analysis using the firm as the observation unit, while the other questions provide exciting research questions for future work.

3.8 Appendix

Figure 3.6: Plot of residuals vs fitted values for the fixed effects specification and the fourth differences specification.

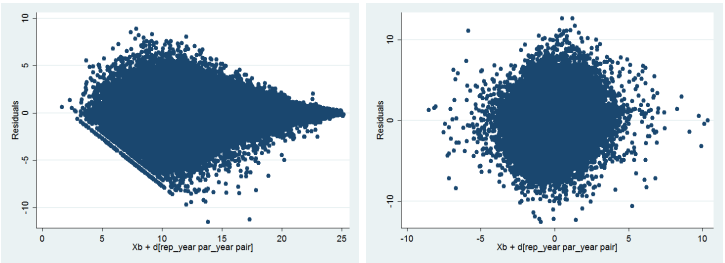


Table 3.6: Anticipation effects of FTAs and CUs using feasible GLS

	Full sample				EU12 only
	(1)	(2)	(3)	(4)	(5)
Stage 1	0.10***	0.10***	0.10**	0.09**	0.28***
	(0.025)	(0.025)	(0.039)	(0.039)	(0.048)
Stage 2	0.22***	0.21***	0.28***	0.27***	0.47***
	(0.026)	(0.026)	(0.040)	(0.040)	(0.054)
Stage 3	0.19***	0.18***	0.22***	0.21***	0.50***
	(0.038)	(0.038)	(0.059)	(0.059)	(0.076)
Stage 4	0.21***	0.20***	0.27***	0.25***	0.50***
	(0.041)	(0.042)	(0.063)	(0.064)	(0.079)
Stage 5 and 6	0.36***		0.37***		0.61***
	(0.029)		(0.042)		(0.067)
Stage 5		0.29***		0.28***	
		(0.041)		(0.062)	
Stage 6		0.34***		0.38***	
		(0.032)		(0.045)	
EU accession			0.15***	0.15***	
			(0.027)	(0.027)	
OPTA	0.25***	0.24***	0.51***	0.51***	0.31***
	(0.022)	(0.022)	(0.046)	(0.046)	(0.070)
TWPTA	-0.01	-0.01	-0.48***	-0.11***	-0.65***
	(0.029)	(0.029)	(0.055)	(0.042)	(0.079)
Observations	169,519	169,519	106,387	106,387	63,687

Standard errors clustered on country pair in parentheses. * p<0.1, ** p<0.05 and *** p<0.01. Demeaned country-year fixed effects are included.

Table 3.7: Exogeneity test

	Trade
F5.Stage 1	0.02
Stage 1	0.04
Stage 2	0.14***
Stage 3	0.14**
Stage 4	0.13**
Stage 5	0.26***
Stage 6	0.32***
Observations	126,589

Standard errors in parentheses. * p<0.1, ** p<0.05 and *** p<0.01.

Table 3.8: Stages and characteristics of all EIAs between the EU and third countries during the period 1988-2013.

Country 1	Country 2	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	Stage 7	Type	Bilateral	Follow-up EIA	suspended
EC	Albania	1999	2003	2006	2006	no	2009	no	FTA	yes	no	no
EC	Algeria	1996	2000	2001	2002	no	2005	no	FTA	yes	no	no
EC	Andorra	1989	1989	1990	1990	no	1991	no	CU	yes	no	no
EC	Angola	2000	2002	no	no	no	no	no	TWPTA	no	yes	no
EC	Armenia	2009	2010	2013	no	no	no	no	FTA	yes	no	EIA
EC	Bolivia	2006	no	no	no	no	no	no	FTA	no	no	negotiations
EC	Bosnia Herzegovina	1999	2005	2006	2008	2008	no	no	FTA	yes	no	no
EC	Brunei	2007	no	no	no	no	no	no	FTA	no	no	negotiations
EC	Burma	2003	no	no	no	no	no	no	FTA	no	no	negotiations
EC	Cambodia	2004	no	no	no	no	no	no	FTA	no	no	negotiations
EC	Canada	2007	2009	2014	2015		no	no	FTA	yes	no	no
EC	Chile	1998	2000	2002	2002	2003	2005	no	FTA	yes	no	no
EC	Colombia	2006	2009	2011	2012	2013	no	no	FTA	yes	no	no
EC	Cote d'Ivoire	2000	2002	2007	2008	2008	no	no	TWPTA	yes	yes	no
EC	Ecuador	2006	2009	2014	2014	no	no	no	FTA	no	no	negotiations
EC	Egypt	1994	1995	1999	2001	2004	2004	no	FTA	yes	no	no
EC	Faroe Islands	1990	1990	1991	1991	no	1992	1997	FTA	yes	no	no
EC	Fiji	2002	2004	2007	2009		2014	no	TWPTA	yes	yes	no
EC	Georgia	2009	2010	2013	2014	2014	no	no	FTA	yes	no	no
EC	Ghana	2000	2003	2007	2014	no	no	no	TWPTA	no	yes	no
EC	Iceland						1973	no	FTA	no	no	no
EC	India	2007	2007	no	no	no	no	no	FTA	yes	no	no
EC	Indonesia	2007	no	no	no	no	no	no	FTA	no	no	negotiations
EC	Israel	1992	1993	1995	1995	1995	2000	no	FTA	yes	no	no
EC	Japan	2012	2013	no	no	no	no	no	FTA	yes	no	no
EC	Jordan	1995	1996	1997	1997		2002	no	FTA	yes	no	no
EC	Laos	2005	no	no	no	no	no	no	FTA	no	no	negotiations
EC	Lebanon	1995	1996	2002	2002	2003	2006	no	FTA	yes	no	no
EC	Libya	2008	2008	no	no	no	no	no	FTA	yes	no	negotiations
EC	Liechtenstein						1973	no	CU	no	no	no
EC	Macedonia	1999	2000	2000	2001		2004	no	FTA	yes	no	no
EC	Malaysia	2007	2010	no	no	no	no	no	FTA	no	no	no
EC	Mexico	1995	1998	1999	2000	no	2000	no	FTA	yes	no	no
EC	Moldova	2009	2010	2013	2014	2014	2014	no	FTA	yes	no	no
EC	Montenegro	2006	2006	2006	2007	2008	2010	no	FTA	yes	no	no
EC	Morocco		1993	1995	1996	no	2000	no	FTA	yes	no	no
EC	Namibia	2000	2002	2014	2014	no	no	no	TWPTA	no	yes	no
EC	Norway						1973	no	CU	no	no	no
EC	OCT						1971	no	FTA	no	no	no
EC	Palestine	.	.	.	.	1995	2000	no	FTA	yes	no	no
EC	Papua New Guinea	2002	2004	2007	2009		2011	no	TWPTA	yes	yes	no
EC	Peru	2006	2009	2011	2012	2013	no	no	FTA	yes	no	no
EC	Philippines	2007	no	no	no	no	no	no	FTA	no	no	no
EC	San Marino				1991		1993	no	CU	yes	no	no
EC	Serbia	2005	2006	2006	2008	2010	2013	no	FTA	yes	no	no

Table 3.8: Stages and characteristics of all EIAs between the EU and third countries - continued.

Country 1	Country 2	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	Stage 7	Type	Bilateral	Follow-up EIA	suspended
EC	Singapore	2007	2010	2012	2013		2013	no	FTA	no	no	no
EC	South Africa	1994	1995	1999	2000	2000	2004	no	FTA	yes	no	no
EC	South Korea	2006	2007	2009	2010	2011	2011	no	FTA	yes	no	no
EC	Switzerland						1973	no	FTA	no	no	no
EC	Syria	1977		2004	no	no	no	no	FTA	yes	no	EIA
EC	Thailand	2007	2013	no	no	no	no	no	FTA	no	no	no
EC	Tunisia	1993		1995	1995	no	1998	no	FTA	yes	no	no
EC	Turkey	1963	.	.	1995		1996	no	CU	yes	no	no
EC	Ukraine	2006	2008	2011	2014	no	2016	no	FTA	yes	no	no
EC	US	2012	2013	no	no	no	no	no	FTA	yes	no	no
EC	Vietnam	2007	2012	no	no	no	no	no	FTA	no	no	no
EC	Antigua and Barbuda	2000	2004	2007	2008		2008	no	TWPTA	no	yes	no
EC	Bahamas	2000	2004	2007	2008		2008	no	TWPTA	no	yes	no
EC	Barbados	2000	2004	2007	2008		2008	no	TWPTA	no	yes	no
EC	Belize	2000	2004	2007	2008		2008	no	TWPTA	no	yes	no
EC	Dominica	2000	2004	2007	2008		2008	no	TWPTA	no	yes	no
EC	Grenada	2000	2004	2007	2008		2008	no	TWPTA	no	yes	no
EC	Guyana	2000	2004	2007	2008		2008	no	TWPTA	no	yes	no
EC	Haiti	2000	2004	2007	2008		2008	no	TWPTA	no	yes	no
EC	Jamaica	2000	2004	2007	2008		2008	no	TWPTA	no	yes	no
EC	Saint Kitts and Nevis	2000	2004	2007	2008		2008	no	TWPTA	no	yes	no
EC	Saint Lucia	2000	2004	2007	2008		2008	no	TWPTA	no	yes	no
EC	Saint Vincent	2000	2004	2007	2008		2008	no	TWPTA	no	yes	no
EC	Suriname	2000	2004	2007	2008		2008	no	TWPTA	no	yes	no
EC	Trinidad and Tobago	2000	2004	2007	2008		2008	no	TWPTA	no	yes	no
EC	Dominican Republic	2000	2004	2007	2008		2008	no	TWPTA	no	yes	no
EC	Cameroon	2000	2002	2007	2008	2009	2014	no	TWPTA	no	yes	no
EC	Central African Rep	2000	2002	no	no	no	no	no	TWPTA	no	yes	no
EC	Chad	2000	2002	no	no	no	no	no	TWPTA	no	yes	no
EC	Congo	2000	2002	no	no	no	no	no	TWPTA	no	yes	no
EC	Congo Brazzaville	2000	2002	no	no	no	no	no	TWPTA	no	yes	no
EC	Equatorial Guinea	2000	2002	no	no	no	no	no	TWPTA	no	yes	no
EC	Gabon	2000	2002	no	no	no	no	no	TWPTA	no	yes	no
EC	Sao Tome & Principe	2000	2002	no	no	no	no	no	TWPTA	no	yes	no
EC	Costa Rica	2006	2007	2010	2012	2013	no	no	FTA	no	no	no
EC	El Salvador	2006	2007	2010	2012	2013	no	no	FTA	no	no	no
EC	Guatemala	2006	2007	2010	2012	2013	no	no	FTA	no	no	no
EC	Honduras	2006	2007	2010	2012	2013	no	no	FTA	no	no	no
EC	Nicaragua	2006	2007	2010	2012	2013	no	no	FTA	no	no	no
EC	Panama	2006	2007	2010	2012	2013	no	no	FTA	no	no	no
EC	Burundi	2000	2002	2014	2015	2008	2015	no	TWPTA	no	yes	no
EC	Kenya	2000	2002	2014	2015	2008	2015	no	TWPTA	no	yes	no
EC	Rwanda	2000	2002	2014	2015	2008	2015	no	TWPTA	no	yes	no
EC	Tanzania	2000	2002	2014	2015	2008	2015	no	TWPTA	no	yes	no
EC	Uganda	2000	2002	2014	2015	2008	2015	no	TWPTA	no	yes	no

Table 3.8: Stages and characteristics of all EIAs between the EU and third countries - continued.

Country 1	Country 2	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	Stage 7	Type	Bilateral	Follow-up EIA	suspended
EC	Madagascar	2000	2004	2007	2009	2012	no	no	TWPTA	no	yes	no
EC	Mauritius	2000	2004	2007	2009	2012	no	no	TWPTA	no	yes	no
EC	Seychelles	2000	2004	2007	2009	2012	no	no	TWPTA	no	yes	no
EC	Zimbabwe	2000	2004	2007	2009	2012	no	no	TWPTA	no	yes	no
EC	Comoros	2000	2004	2007	no	no	no	no	TWPTA	no	yes	no
EC	Zambia	2000	2004	2007	no	no	no	no	TWPTA	no	yes	no
EC	Djibouti	2000	2004	no	no	no	no	no	TWPTA	no	yes	no
EC	Eritrea	2000	2004	no	no	no	no	no	TWPTA	no	yes	no
EC	Ethiopia	2000	2004	no	no	no	no	no	TWPTA	no	yes	no
EC	Malawi	2000	2004	no	no	no	no	no	TWPTA	no	yes	no
EC	Sudan	2000	2004	no	no	no	no	no	TWPTA	no	yes	no
EC	Bahrain	1988	1990	no	no	no	no	no	FTA	no	no	negotiations
EC	Kuwait	1988	1990	no	no	no	no	no	FTA	no	no	negotiations
EC	Oman	1988	1990	no	no	no	no	no	FTA	no	no	negotiations
EC	Qatar	1988	1990	no	no	no	no	no	FTA	no	no	negotiations
EC	Saudi Arabia	1988	1990	no	no	no	no	no	FTA	no	no	negotiations
EC	UAE	1988	1990	no	no	no	no	no	FTA	no	no	negotiations
EC	Argentina	1999	2000	no	no	no	no	no	FTA	no	no	negotiations
EC	Brazil	1999	2000	no	no	no	no	no	FTA	no	no	negotiations
EC	Paraguay	1999	2000	no	no	no	no	no	FTA	no	no	negotiations
EC	Uruguay	1999	2000	no	no	no	no	no	FTA	no	no	negotiations
EC	Venezuela	1999	2000	no	no	no	no	no	FTA	no	no	negotiations
EC	Botswana	2000	2002	2014	2014	2009	no	no	TWPTA	no	yes	no
EC	Lesotho	2000	2002	2014	2014	2009	no	no	TWPTA	no	yes	no
EC	Mozambique	2000	2002	2014	2014	2009	no	no	TWPTA	no	yes	no
EC	Swaziland	2000	2002	2014	2014	2009	no	no	TWPTA	no	yes	no
EC	Benin	2000	2003	2014	2014	no	no	no	TWPTA	no	yes	no
EC	Burkina Faso	2000	2003	2014	2014	no	no	no	TWPTA	no	yes	no
EC	Cape Verde	2000	2003	2014	2014	no	no	no	TWPTA	no	yes	no
EC	Gambia	2000	2003	2014	2014	no	no	no	TWPTA	no	yes	no
EC	Guinea	2000	2003	2014	2014	no	no	no	TWPTA	no	yes	no
EC	Guinea-Bissau	2000	2003	2014	2014	no	no	no	TWPTA	no	yes	no
EC	Liberia	2000	2003	2014	2014	no	no	no	TWPTA	no	yes	no
EC	Mali	2000	2003	2014	2014	no	no	no	TWPTA	no	yes	no
EC	Mauritania	2000	2003	2014	2014	no	no	no	TWPTA	no	yes	no
EC	Niger	2000	2003	2014	2014	no	no	no	TWPTA	no	yes	no
EC	Nigeria	2000	2003	2014	2014	no	no	no	TWPTA	no	yes	no
EC	Senegal	2000	2003	2014	2014	no	no	no	TWPTA	no	yes	no
EC	Sierra Leone	2000	2003	2014	2014	no	no	no	TWPTA	no	yes	no
EC	Togo	2000	2003	2014	2014	no	no	no	TWPTA	no	yes	no
EC	Egypt	2011	no	no	no	no	no	no	FTA	yes	yes	no
EC	Faroe Islands	.	.	.	1996		1997	no	FTA	yes	yes	no
EC	Jordan	2011	no	no	no	no	no	no	FTA	yes	yes	no
EC	Morocco	2011	2013	no	no	no	no	no	FTA	yes	yes	no
EC	South Africa		2007	2014	2014	no	no	no	TWPTA	yes	yes	no

Table 3.8: Stages and characteristics of all EIAs between the EU and third countries - continued.

Country 1	Country 2	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	Stage 7	Type	Bilateral	Follow-up EIA	suspended
EC	Mexico	2013	no	no	no	no	no	no	FTA	yes	yes	no
EC	Tunisia	2011	no	no	no	no	no	no	FTA	yes	yes	no
Austria	Iceland						1961	1994	FTA	no	no	no
Austria	Israel	1991	1991	1992	1992	no	1993	1994	FTA	yes	no	no
Austria	Liechtenstein						1961	1994	FTA	no	no	no
Austria	Norway						1961	1994	FTA	no	no	no
Austria	Switzerland						1961	1994	FTA	no	no	no
Austria	Turkey	.	.	1991	1991	no	1992	1994	FTA	yes	no	no
Bulgaria	Albania	2001	2002	2003	2003	no	2003	2006	FTA	yes	no	no
Bulgaria	Bosnia Herzegovina	1999	2000	2001	2001	no	2003	2006	FTA	yes	no	no
Bulgaria	Iceland	1991	1991	1992	1993	no	1994	2006	FTA	no	no	no
Bulgaria	Israel	.	.	2001	2001	no	2002	2006	FTA	yes	no	no
Bulgaria	Liechtenstein	1991	1991	1992	1993	no	1994	2006	FTA	no	no	no
Bulgaria	Macedonia	1999	1999	1999	1999	no	1999	2006	FTA	yes	no	no
Bulgaria	Moldova	1999	2000	2002	2002	no	2003	2006	FTA	yes	no	no
Bulgaria	Montenegro	1999	2000	2001	2001	no	2003	2006	FTA	yes	no	no
Bulgaria	Norway	1991	1991	1992	1993	no	1994	2006	FTA	no	no	no
Bulgaria	Serbia	1999	2000	2002	2002	no	2003	2006	FTA	yes	no	no
Bulgaria	Switzerland	1991	1991	1992	1993	no	1994	2006	FTA	no	no	no
Bulgaria	Turkey	1995	1996	1998	1998	no	1998	2006	FTA	yes	no	no
Cyprus	Armenia	.	.	.	1995	no	1995	2006	FTA	yes	no	no
Czech Rep.	Iceland	1990	1990	1992	1992	no	1992	2003	FTA	no	no	no
Czech Rep.	Israel	.	.	.	1996	no	1996	2003	FTA	yes	no	no
Czech Rep.	Liechtenstein	1990	1990	1992	1992	no	1992	2003	FTA	no	no	no
Czech Rep.	Norway	1990	1990	1992	1992	no	1992	2003	FTA	no	no	no
Czech Rep.	Switzerland	1990	1990	1992	1992	no	1992	2003	FTA	no	no	no
Czech Rep.	Turkey	.	.	1996	1997	no	1997	2003	FTA	yes	no	no
Estonia	Armenia	.	.	.	.	.	2002	2003	FTA	yes	no	no
Estonia	Faroe Islands	.	.	1997	1997	no	1998	2003	FTA	yes	no	no
Estonia	Iceland	1991	1991	1995	1995	1996	1997	2003	FTA	no	no	no
Estonia	Liechtenstein	1991	1991	1995	1995	1996	1997	2003	FTA	no	no	no
Estonia	Norway	1991	1991	1995	1995	1996	1997	2003	FTA	no	no	no
Estonia	Switzerland	1991	1991	1995	1995	1996	1997	2003	FTA	no	no	no
Estonia	Turkey	.	.	1997	1997	no	1998	2003	FTA	yes	no	no
Estonia	Ukraine	.	.	1995	1995	no	1996	2003	FTA	yes	no	no
Finland	Iceland						1961	1994	FTA	no	no	no
Finland	Israel	1991	1991	1992	1992	no	1993	1994	FTA	yes	no	no
Finland	Liechtenstein						1961	1994	FTA	no	no	no
Finland	Norway						1961	1994	FTA	no	no	no
Finland	Switzerland						1961	1994	FTA	no	no	no
Finland	Turkey	.	.	1991	1991	no	1992	1994	FTA	yes	no	no
Hungary	Iceland	1990	1990	1992	1993	no	1993	2003	FTA	no	no	no
Hungary	Israel	.	.	1996	1997	no	1998	2003	FTA	yes	no	no
Hungary	Liechtenstein	1990	1990	1992	1993	no	1993	2003	FTA	no	no	no
Hungary	Norway	1990	1990	1992	1993	no	1993	2003	FTA	no	no	no

Table 3.8: Stages and characteristics of all EIAs between the EU and third countries - continued.

Country 1	Country 2	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	Stage 7	Type	Bilateral	Follow-up EIA	suspended
Hungary	Switzerland	1990	1990	1992	1993	no	1993	2003	FTA	no	no	no
Hungary	Turkey	.	.	1996	1997	no	1997	2003	FTA	yes	no	no
Latvia	Iceland	1991	1991	1995	1995	no	1996	2003	FTA	no	no	no
Latvia	Liechtenstein	1991	1991	1995	1995	no	1996	2003	FTA	no	no	no
Latvia	Norway	1991	1991	1995	1995	no	1996	2003	FTA	no	no	no
Latvia	Switzerland	1991	1991	1995	1995	no	1996	2003	FTA	no	no	no
Latvia	Turkey	.	.	.	1998	no	2000	2003	FTA	yes	no	no
Lithuania	Iceland	1991	1991	1995	1995	no	1997	2003	FTA	no	no	no
Lithuania	Liechtenstein	1991	1991	1995	1995	no	1997	2003	FTA	no	no	no
Lithuania	Norway	1991	1991	1995	1995	no	1997	2003	FTA	no	no	no
Lithuania	Switzerland	1991	1991	1995	1995	no	1997	2003	FTA	no	no	no
Lithuania	Turkey	.	.	1997	1997	no	1998	2003	FTA	yes	no	no
Poland	Faroe Islands	.	.	.	1998	no	1999	2003	FTA	yes	no	no
Poland	Iceland	1990	1990	1992	1992	1993	1994	2003	FTA	no	no	no
Poland	Israel	.	.	1997	1997	no	1997	2003	FTA	yes	no	no
Poland	Liechtenstein	1990	1990	1992	1992	1993	1994	2003	FTA	no	no	no
Poland	Norway	1990	1990	1992	1992	1993	1994	2003	FTA	no	no	no
Poland	Switzerland	1990	1990	1992	1992	1993	1994	2003	FTA	no	no	no
Poland	Turkey	1996	1997	1999	1999	no	1999	2003	FTA	yes	no	no
Romania	Albania	2001	2001	2003	2003	no	2004	2006	FTA	yes	no	no
Romania	Bosnia Herzegovina	1999	2000	2001	2001	no	2002	2006	FTA	yes	no	no
Romania	Iceland	1991	1991	1992	1992	no	1993	2006	FTA	no	no	no
Romania	Israel	.	2000	2000	2001	no	2001	2006	FTA	yes	no	no
Romania	Liechtenstein	1991	1991	1992	1992	no	1993	2006	FTA	no	no	no
Romania	Macedonia	1999	1999	2001	2001	no	2004	2006	FTA	yes	no	no
Romania	Moldova	.	.	1994	1994	no	1994	2006	FTA	yes	no	no
Romania	Montenegro	1999	2000	2001	2001	no	2003	2006	FTA	yes	no	no
Romania	Norway	1991	1991	1992	1992	no	1993	2006	FTA	no	no	no
Romania	Serbia	1999	2000	2001	2002	no	2003	2006	FTA	yes	no	no
Romania	Switzerland	1991	1991	1992	1992	no	1993	2006	FTA	no	no	no
Romania	Turkey	.	.	1996	1997	no	1998	2006	FTA	yes	no	no
Slovakia	Iceland	1990	1990	1992	1992	no	1992	2003	FTA	no	no	no
Slovakia	Liechtenstein	1990	1990	1992	1992	no	1992	2003	FTA	no	no	no
Slovakia	Norway	1990	1990	1992	1992	no	1992	2003	FTA	no	no	no
Slovakia	Switzerland	1990	1990	1992	1992	no	1992	2003	FTA	no	no	no
Slovenia	Bosnia Herzegovina	.	.	.	2001	no	2002	2003	FTA	yes	no	no
Slovenia	Iceland	1992	1992	1994	1995	1995	1998	2003	FTA	no	no	no
Slovenia	Liechtenstein	1992	1992	1994	1995	1995	1998	2003	FTA	no	no	no
Slovenia	Macedonia	.	.	1996	1996	no	1996	2003	FTA	yes	no	no
Slovenia	Norway	1992	1992	1994	1995	1995	1998	2003	FTA	no	no	no
Slovenia	Switzerland	1992	1992	1994	1995	1995	1998	2003	FTA	no	no	no
Slovenia	Turkey	.	.	.	1998	no	2000	2003	FTA	yes	no	no
Slovakia	Israel	.	.	.	1996	no	1996	2003	FTA	yes	no	no
Slovakia	Turkey	.	.	1996	1997	no	1997	2003	FTA	yes	no	no
Sweden	Iceland						1961	1994	FTA	no	no	no

Table 3.8: Stages and characteristics of all EIAs between the EU and third countries - continued.

Country 1	Country 2	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	Stage 7	Type	Bilateral	Follow-up EIA	suspended
Sweden	Israel	1991	1991	1992	1992	no	1993	1994	FTA	yes	no	no
Sweden	Liechtenstein						1961	1994	FTA	no	no	no
Sweden	Norway						1961	1994	FTA	no	no	no
Sweden	Switzerland						1961	1994	FTA	no	no	no
Sweden	Turkey	.	.	1991	1991	no	1992	1994	FTA	no	no	no

Note: . indicates missing values.

Table 3.9: Baseline model using standard estimation techniques.

	Fixed effects			Fourth differences			RGDF		
	Trade	IM	EM	Trade	IM	EM	Trade	IM	EM
Stage 1	0.22*	0.33**	-0.11						
	(0.121)	(0.140)	(0.148)						
Stage 2	0.32***	-0.17*	0.49***						
	(0.096)	(0.093)	(0.090)						
Stage 3	0.14	-0.00	0.14*						
	(0.131)	(0.114)	(0.071)						
Stage 4	0.25***	-0.03	0.27***						
	(0.085)	(0.094)	(0.081)						
Stage 5 and 6	0.25***	-0.13	0.38***						
	(0.087)	(0.092)	(0.091)						
Δ_4 stage 1				0.02	0.31*	-0.30**	-0.18	0.31*	-0.49***
				(0.103)	(0.160)	(0.138)	(0.126)	(0.172)	(0.151)
Δ_4 stage 2				0.12	-0.08	0.20**	-0.12	-0.12	0.00
				(0.121)	(0.106)	(0.095)	(0.159)	(0.173)	(0.111)
Δ_4 stage 3				-0.09	-0.21	0.12	-0.30	-0.26*	-0.04
				(0.129)	(0.142)	(0.076)	(0.207)	(0.152)	(0.104)
Δ_4 stage 4				0.18**	-0.00	0.18**	0.06	0.11	-0.05
				(0.085)	(0.115)	(0.074)	(0.185)	(0.182)	(0.119)
Δ_4 stage 5 and 6				0.10	-0.07	0.16**	0.02	-0.11	0.13
				(0.076)	(0.061)	(0.077)	(0.115)	(0.087)	(0.105)
OPTA stage 6	-0.10	-0.20**	0.10*						
	(0.057)	(0.073)	(0.054)						
Δ_4 OPTA stage 6				-0.05	-0.15**	0.10**	0.04	-0.14	0.18***
				(0.068)	(0.072)	(0.042)	(0.089)	(0.106)	(0.055)
Observations	169,510	169,510	169,510	128,062	128,062	128,062	82,670	82,670	82,670

All regressions include importer-year and exporter-year fixed effects. The first and last sets of regressions (i.e. the fixed effects specification and the random growth model (RGDF) specification) also include country pair fixed effects. Standard errors in parentheses. * p<0.1, ** p<0.05 and *** p<0.01.

Table 3.10: Anticipation effects of FTAs and CUs that were suspended at some point versus FTAs and CUs that were never suspended.

	Trade	Trade
Not suspended		
Stage 1	0.04	0.04
	(0.047)	(0.047)
Stage 2	0.09*	0.09*
	(0.050)	(0.050)
Stage 3	0.14**	0.14**
	(0.063)	(0.063)
Stage 4	0.18***	0.18***
	(0.064)	(0.064)
Stage 5	0.22***	0.22***
	(0.062)	(0.062)
Stage 6	0.29***	0.29***
	(0.044)	(0.044)
Suspended at some point		
Stage 1	-0.07	-0.07
	(0.061)	(0.061)
Stage 2	-0.04	-0.04
	(0.057)	(0.061)
Stage 3	0.26	0.26
	(0.175)	(0.175)
Stage 4-6	omitted	omitted
	omitted	omitted
After suspended		0.01
		(0.059)
Observations	166,387	166,387

Standard errors in parentheses.
* p<0.1, ** p<0.05 and *** p<0.01.

Chapter 4

Firm-level impact of trade agreements

4.1 Introduction

With firm-level data becoming more widely available in the last couple of years, firm-level analysis has become an invaluable tool for scholars in international trade. Many of the advances in the theoretical and empirical literature in international trade in recent years have been driven by firm-level analysis. Empirical analysis using information on firm-level export transactions and firm characteristics has unlocked a wealth of information, testing existing models in international trade as well as driving new theoretical models (see for example Bernard and Jensen, 1995; Pavcnik (2002); Bernard et al. (2003); Melitz (2003); Bernard, Redding, and Schott (2007); Bernard et al. (2007); Verhoogen (2008); Kugler and Verhoogen (2012); Chor, Manova, and Yu (2014); Magerman et al. (2015), and many more).

Many papers research the impact of globalization and trade policy on firm behavior using firm heterogeneity as a conceptual framework. For example, Amiti and Konings (2007) study the impact of trade liberalization in Indonesia, Konings and Vandenbussche (2008) look at the heterogeneous responses of firms to trade protection and Abraham, Konings, and Vanormelingen (2009) study the effect of globalization on the price-cost margin of firms union bargaining power. While there is a rich empirical literature on the impact of WTO accessions on firms, this is not the case for bilateral trade liberalizations (see for example Brandt, Van Biesebroeck, and Zhang, 2012; Yu, 2015; Ng and Tuan, 2003 for papers on the effect of China's WTO accession). There are some papers exploring the impact of a specific trade agreement on firm-level exports - especially NAFTA seems to be a popular subject of study (see for example López-Córdova (2002), Alvarez and Robertson (2004), Iacovone and Javorcik (2010) and De Hoyos

and Iacovone (2013) for the impact of NAFTA on Mexican firms). However, it is difficult to extrapolate these findings to other settings. To the best of our knowledge, there are no papers estimating a more general effect of a multitude of trade agreements on firm-level exports.

There are, nevertheless, two major advantages to studying the impact of free trade agreements on trade flows on the firm-level compared to on the country-level. First, a well-established result of the theoretical literature on trade liberalization is the heterogeneous impact on firms. So far, the empirical EIA literature has failed to support this with empirical evidence. Second, studying the impact of EIAs on firms using firm-level data is an ideal robustness check to the extensive country-level literature estimating the effects of EIAs. While the trade creating effects of trade agreements on the macro-level are quite robust, this needn't be on the micro-level due to firm heterogeneity.

This paper makes a first attempt at determining the impact of trade agreements on firms. More specifically, we want to estimate the effect trade agreements have on heterogeneous firms. We do this by using a rich panel dataset for Belgium on the firm-level for the period 2002-2014. Next to standard gravity variables and data on trade agreements, our dataset comprises of two main sources: the National Bank of Belgium's Trade Database consisting of all Belgian manufacturing exporters and a dataset with firm characteristics such as firm size, age and productivity obtained from the Belgian Business Registry of firms. We can link both datasets together through a common firm identifier, resulting in a very rich panel. This allows us not only to estimate the impact of EIAs on firms, but also to look at the interaction between the impact of EIAs and firm characteristics.

Our analysis proceeds in several steps. We start by estimating a general partial equilibrium effect of trade agreements on firm-level exports, by translating the gravity equation to firm-level exports. We augment the gravity equation with firm characteristics to control for firm heterogeneity, and try different fixed effects structures. We find a positive effect of trade agreements on firm-level trade flows.

We continue our analysis by zooming in on the timing of trade policy effects. We do this by exploring whether trade agreements have effects before they enter into force officially and for how long they keep on stimulating trade after entry into force. We find clear indications that firms anticipate trade agreements: the average firm starts exporting more once FTA negotiations start. Whether or not trade agreements keep stimulating trade up to five years after their official implementation is less clear. Moreover, firms anticipate trade agreements by entering FTA markets ahead of entry into force.

Next, we look at the heterogeneous impact of EIAs on different types of firms. We first include interaction effects of our trade agreement dummy

and firm characteristics in our model, and then allow for a non-linear relation between firm characteristics and the effects of a trade agreement by estimating quantile regressions. We find that trade agreements have a homogeneous impact on firm-level exports in terms of firm productivity and profitability, but a heterogeneous impact in terms of age and firm size. We find that especially firms with 50 to 99 employees tend to take advantage of the opportunities presented by trade agreements, as well as old firms.

Finally, we look at the impact of trade agreements on different margins of trade. We find that the probability of firms starting to export new products to a market is higher when there is a trade agreement with market. This regardless of whether the firm is already active on that market (product diversification) or not (product-market diversification). This is consistent with Eckel and Neary (2010), who find that firms expand their range of products in markets with trade agreements.

This paper is structured as follows. Section 4.2 sharpens intuition about the impact of trade agreements on firm level exports by discussing a theoretical framework, while 4.3 describes the data used in detail. In section 4.4, we take a first look at the data using extensive summary statistics, while in section 4.5 we provide a general estimation of the impact of trade agreements on firm level exports. Section 4.6 looks at the timing of trade policy effects and section 4.7 investigates if we can identify sources of heterogeneity of FTA effects. Section 4.8 takes a closer look at exporter dynamics and several margins of trade and section 4.9 concludes.

4.2 Theoretical framework

Since the seminal work by Melitz (2003), heterogeneity has been on the forefront of the international trade literature. Firm heterogeneity has been found to be important in explaining differences between exporters and non-exporters[1], as well as differences *across* exporting firms[2]. Recently, papers have started incorporating this heterogeneity into more detail in theoretical models of multi-product multi-destination firms (see for example Mayer, Melitz, and Ottaviano (2014), Bernard, Redding, and Schott (2011), Eckel and Neary (2010), and Arkolakis, Ganapati, and Muendler (2016)).

Arkolakis, Ganapati, and Muendler (2016) extend Melitz (2003) to a multi-product setting and generalize the multi-product models of Eckel and Neary (2010), Eaton, Kortum, and Kramarz (2011), Chaney (2008), and

[1] Exporters have consistently been found to be more productive, larger, profitable and pay higher wages than non-exporters (Mayer and Ottaviano, 2008). The discussion whether these differences are caused by self-selection or learning-by-exporting is still ongoing (Wagner, 2007; Wagner, 2012; De Loecker, 2013).

[2] Soete and Viegelahn (2017), for example, show that heavy exporters behave differently than light exporters with respect to five productivity and labour market indicators.

Bernard, Redding, and Schott (2011)). Heterogeneity is modeled on the firm-level, as well as on the firm-product-destination-level. This is similar to Eaton, Kortum, and Kramarz (2011) who include local product appeal shocks and Eckel and Neary (2010) who assume that firms face declining efficiency in supplying additional products that are farther from its core competency.

Crucial in the model are the three types of costs firms face. First, as is standard in the literature, firms face iceberg trade costs for shipping goods. Second, firms incur a product-specific cost to cover production costs. This cost is constant for a given product, but higher for products farther away from a firm's core competency. This will be important when firms choose how many products to export. Third, firms have to pay a fixed cost of exporting. In contrast to two-country models (e.g. Bergin and Lin, 2012; Burstein and Melitz, 2011; Costantini and Melitz, 2008), this fixed cost varies by firm, product *and* destination market. The introduction of this market access cost allows to capture the specificities of many trade policy instruments such as non-tariff barriers. The market access cost affects a firm's decision to enter a destination with the first product and its decision on how many products to export to that destination. It does not affect how much of a given product firms will export to a given destination (intensive margin).

Firms hence have to make two decisions. After drawing a productivity parameter and a destination specific market access cost shock, firms choose how many products to export to a given destination and what price to charge for each product at each destination. Firms with the same productivity and the same access cost shock for a given destination will make identical product entry decisions in equilibrium, while more productive firms will introduce more products in a given destination.

While Arkolakis, Ganapati, and Muendler (2016) do not analyze the impact of a trade liberalization, predictions can be derived using key equations of the model. In the model, a given firm with productivity parameter ϕ and access cost shock c_j will export goods from country i to country j if and only if it will make non-negative profits, i.e. $\pi_{ij}(\phi, c_j) \geq 0$. Arkolakis, Ganapati, and Muendler (2016) show that this translates into the following productivity threshold $\phi^*_{ij}(c_j)$ for exporting at all from i to j

$$\phi^*_{ij}(c_j)^{\sigma-1} \equiv c_j f_{ij}(1) \left(\frac{\tilde{\sigma} \tau_{ij} \omega_i}{PP_j} \right)^{\sigma-1} \frac{\sigma}{T_j} \tag{4.1}$$

with σ a parameter representing CES consumer preferences, ω_i wage of the representative consumer, τ_{ij} representing standard iceberg shipping costs (with $\tau_{ij} > 1$ and $\tau_{ii} = 1$), $\tilde{\sigma}$ product mark-up, T_j the total expenditure of consumers in country j, PP_j the corresponding ideal price index and $c_j f_{ij}(p)$ the so-called *incremental market access cost* for product p. This

cost is product-destination specific and consists of the idiosyncratic market access cost $c_j \in (0, \infty)$ and the fixed costs of production $f_{ij}(p)$, with $f_{ij}(p)$ a continuous function in $[1, +\infty)$ and $0 < f_{ii}(p) < f_{ij}(p)$. The firm's market access cost is zero when a firm produces no products and strictly positive otherwise, i.e. $f_{ij}(0) = 0$ and $f_{ij}(p) > 0$ for all $p = 1, 2, ..., P_{ij}$. The incremental market access cost captures the barriers to access that may be different for various exporters depending on the number of products sold, while the idiosyncratic access cost shock implies that there is no strict hierarchy of destinations across exporters: some exporters may sell to less popular destinations but not to the most popular ones.

The firm's total sales in equilibrium at a destination j is

$$x_{ij}(\phi, c_j, \boldsymbol{\xi}) = \sigma c_j f_{ij}(1) \left(\frac{\phi}{\phi^*_{sd}(c_j)} \right)^{\sigma-1} \left(\sum_{p=1}^{P_{ij}(\phi, c_j)} h(p)^{-(\sigma-1)} \xi_{pij} \right) \quad (4.2)$$

with $P_{ij}(\phi, c_j)$ the number of products a firm chooses to export to a certain destination, $h(p)$ the marginal-cost schedule of a product and $\boldsymbol{\xi}$ a vector of product specific i.i.d. taste shocks ξ_{pij} for every firm-product.

This determines the average sales per product (intensive margin) exported from i to j

$$\bar{x}_{ij}(\phi, c_j, \boldsymbol{\xi}) \equiv \frac{x_{ij}(\phi, c_j, \boldsymbol{\xi})}{P_{ij}(\phi, c_j)} \quad (4.3)$$

A trade liberalization such as the entry into force of a trade agreement will result in a reduction of trade costs. Specifically, in this model, this would result in lower iceberg shipping costs τ_{ij} because of tariff reductions as well as a lower market access cost c_j because of reductions of NTBs such as technical standards. Product-specific production costs are not affected.

Using the key equations, it is easy to see how a reduction of τ_{ij} and c_j will affect firm behavior. First of all, a drop in τ_{ij} will result in a reduction of the productivity threshold $\phi^*_{ij}(c_j)$, meaning that more firms will enter and start exporting from i to j. This reduction in the productivity threshold also implies an increase in firm's total sales at destination j because of an increase in the average sales per product at that destination. The number of products exported by destination is not affected by a change in iceberg costs. Second, a drop in c_j will increase the number of products a firm exports to a destination $P_{ij}(\phi, c_j)$ and decrease the threshold productivity $\phi^*_{ij}(c_j)$ needed to overcome for firms to enter. This in turn will increase firm's total sales at a destination and the number of products exported there. The effect on average sales per product exported to a given destination is ambiguous, as in the model new products are exported less intensively than older products.

To summarize, following a trade agreement, we expect to see an increase in the number of firms entering that market, as well as an increase in total

sales of firms that were already active in that market. The number of products exported to that destination will also increase, while the effect on average sales per exported product is not clear.

4.3 Data

The empirical analysis draws from four main datasets for the years 2002-2014: (i) firm characteristics collected by the Central Balance Sheet Office, administered by the National Bank of Belgium (NBB), (ii) firm-level export data from the Foreign Trade Statistics at the NBB, (iii) data on trade agreements and (iv) standard gravity covariates. Firms are identified by their value-added tax (VAT) number, which is unique and common across these databases. Our final dataset has four dimensions: firm, year, product and destination. In contrast to the previous two chapters, we focus solely on exports in this chapter.

Firm characteristics. Virtually all enterprises registered in Belgium have to file annual accounts at the end of their fiscal year.[3] We extract enterprise-level information from the annualized annual accounts at the NBB. The annualized annual accounts transform all information in the annual accounts from fiscal years to calendar years. This transformation makes sure that all firm-level information in our database is consistent with observations in the VAT transaction data. We extract information on added value per worker, number of employees, firmsize, profits/losses, and age of the company. Firmsize is defined as total firm exports, and the number of employees is recorded as full time equivalent (FTE). We calculate value added of the enterprise as turnover minus intermediate inputs. Turnover is defined as total sales of the enterprise in a given year, while intermediate inputs are defined as the sum of material and service inputs to the enterprise.

We drop enterprises that have less than one FTE or that do not report employment data to account for very small enterprises (including management enterprises). Although dropping these companies means losing almost half of all firms in our sample in 2002 and 2014, this does not result in an equally large loss of information. Very small firms do not have to report turnover, inputs or employment. Moreover, these firms are likely to behave in a different way and could exist only for fiscal reasons. The firms that we withhold account for most of the economic activity in Belgium. We also

[3] These also include foreign companies with a branch in Belgium or whose securities are officially listed in Belgium. The following corporations do not have to report annual accounts: public institutions, insurance companies, investment and mutual funds, self-employed workers, companies with unlimited liability, agricultural partnerships, hospitals, health insurance funds, professional associations, and schools and higher education institutions.

drop enterprises that generate negative value added or that have missing values for any of the firm characteristics. Table 4.14 in the appendix reports for each firm characteristic how many observations we retain by year when applying these selection criteria.

Firm-level exports. Data on exports from manufacturing firms comes from the Foreign Trade Statistics database administered by the NBB. We only use extra-European Union export flows (Extrastat). For extra-EU destinations, all transactions with a minimum value of 1000 euros or a weight of more than 1000 kg have to be reported.[4] The export data are recorded at the firm-year-product-country level; i.e. we observe all export flows of firm f in year t for product p to destination j. Products are defined as eight-digit Combined Nomenclature (CN8) products.

We exclude transactions that do not involve a "change in ownership". Hence, we omit transaction flows such as the return or replacement of goods, movements of stock and transactions without compensation (e.g. goods sent for further processing or for repair after the repair has been executed).

Finally, the CN8 classification changes over time. To construct a consistent panel and avoid misinterpreting a change in the CN8 codes as a change in the number of products, we concord the annual changes in the CN8 classification over time. To do so, we use the algorithm provided by Van Beveren, Bernard, and Vandenbussche (2012).[5]

Trade agreement data. Data on trade agreements between Belgium and the rest of the extra-EU world is based on chapter 2, but has been updated to also include the year 2014. In this paper, we will focus on FTAs, CUs and CMs. This because there are no economic union agreements between Belgium and third countries, on the one hand, and because it has been shown by Soete and Van Hove (2017) that preferential trade agreements between the European Union and third countries do not impact trade, on the other hand. The data vary at the year-destination level and are summarized in table 4.1.

Gravity covariates. Standard covariates used in the gravity literature come from the CEPII BACI database. We use nominal GDP of the partner country, weighted distance between Belgium and the partner country, common language spoken in both countries by at least 20% of the population

[4] This is not the case for intra-EU trade, for which the tresholds are a lot higher, and not constant over time. The cut-off for reporting intra-EU trade was 250,000 euros in 1998, but has increased since then.

[5] This methodology is very similar to Pierce and Schott's (2009) concordance of the US 10-digit Harmonized System classification.

and colonial ties. All covariates vary at the destination level, except for GDP, which varies at the destination-year level.

Table 4.1: EIAs in force between Belgium and the rest of the world for the period 2002-2014.

Date	Agreement	EIA	Date	Agreement	EIA
1971	EU-OCT	FTA	2001	EU-Macedonia	FTA
1973	EU-Liechtenstein	FTA	2002	EU-Jordan	FTA
1973	EU-Switzerland	FTA	2002	EU-San Marino	CU
1973	EU-Iceland	FTA	2003	EU-Lebanon	FTA
1973	EU-Norway	FTA	2003	EU-Chile	FTA
1991	EU-Andorra	CU	2004	EU-Montenegro	FTA
1994	EU-Liechtenstein	CM	2004	EU-Egypt	FTA
1994	EU-Iceland	CM	2005	EU-Algeria	FTA
1994	EU-Norway	CM	2006	EU-Albania	FTA
1995	EU-Israel	FTA	2008	EU-Bosnia-Herzegovina	FTA
1996	EU-Turkey	CU	2010	EU-Serbia	FTA
1997	EU-Faeroe Islands	FTA	2011	EU-South-Korea	FTA
1997	EU-Palestine	FTA	2013	EU-Honduras	FTA
1998	EU-Tunisia	FTA	2013	EU-Peru	FTA
2000	EU-South Africa	FTA	2013	EU-Panama	FTA
2000	EU-Morocco	FTA	2013	EU-Colombia	FTA
2000	EU-Mexico	FTA	2013	EU-Nicaragua	FTA

Date refers to the (provisional) entry into force of an agreement. Only trade agreements with extra-EU countries are shown.

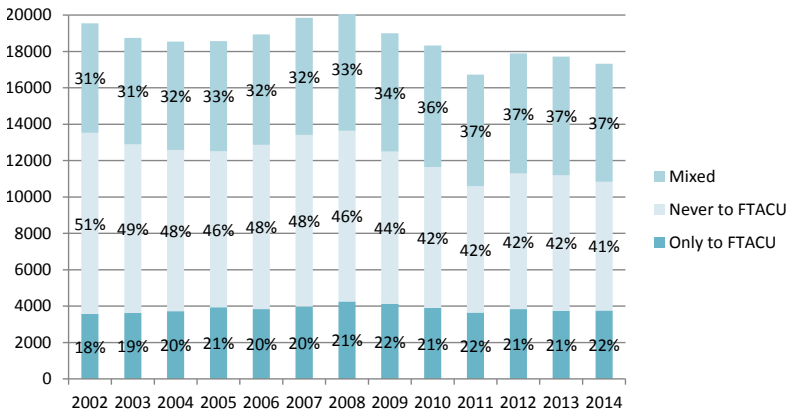
4.4 Setting the stage of Belgium's exporting firms

In this section, we want to outline a general picture of Belgian exports. As there are already papers characterizing Belgium's firm-level exports (see for example Muûls and Pisu (2009), Bernard, Van Beveren, and Vandenbussche (2014), Dhyne et al. (2014), di Comite, Thisse, and Vandenbussche (2014), Amiti, Itskhoki, and Konings (2014), Magerman et al. (2015) and Muûls (2015)), we will focus our attention here on comparing key indicators of Belgian exports to all destinations with trade agreement destinations. Different summary statistics on Belgian extra-EU exports for 2014 are presented in table 4.2, 4.3 and 4.4.

Being a small, open economy, Belgium consists of many small exporting firms, exporting a small number of products to a small number of countries. Most firms export to only one extra-EU destination (namely 8,088 firms in 2014, or 47% of all exporting firms). Only one quarter of the Belgian firms exports to five or more destinations, and less than 10% exports to twelve or more destinations. While few in number, these firms account for a majority of exports, with the average firm serving five or more destinations exporting

more than 1000 times what a single-destination firm exports. Counting the number of destinations with a trade agreement firms exports to, we find that a lion's share of Belgian companies that exports to extra-EU destinations exports to at least one destination with a trade agreement (59% of all firms in 2014). Of these firms, the majority (56%) exports to only one destination with a trade agreement. Only 20% of the firms exporting to destinations with trade agreements, exports to four or more destinations with a trade agreement. 7081 firms, or 41% of all firms in 2014 never export to a destination with a trade agreement.

Figure 4.1: Firms exporting to destinations with or without an FTA or CU.



During our sample period, the number of Belgian firms exporting to

Table 4.2: Summary statistics for 2014 by number of export destinations per firm.

Destinations	Firms					Products	
	All destinations			With TA		All dest.	With TA
	Freq.	%	Value	Freq.	%	Number	Number
0	-	-	-	7081	41	-	-
1	8088	47	73,501	5748	33	2.1	2.1
2	2668	15	240,302	1628	9	4.5	3.4
3	1370	8	568,167	1815	5	7.5	4.2
4	891	5	544,623	472	3	11.3	5.9
5-166	4309	26	87,042,734	1582	9	98.5	36.9
Total	17,326	100	2,491,822	17,326	100	28.0	16.3

Value is export value per firm, averaged over all firms serving the same number of export destinations.

Table 4.3: Firm characteristics for 2014.

	Added value per worker	Employees (FTE)	Profits	Age
Mean	254,040	206	1.69e+07	26
Standard deviation	465,480	565	1.67e+08	19
Minimum	31.6	1	-9.12e+08	0
Maximum	3.51e+07	36,468	1.85e+10	195
All destinations	7,679,282	54	1,884,840	24
Single destination	206,597	33	348,099	21
Single destination with FTA	207,032	31	560,666	21

Age denotes the number of years since the foundation of the company (and hence not the number of years since the company started exporting).

Table 4.4: Summary statistics by firm by destination for 2014.

	All destinations	Destinations with an FTA or CU
Average number of products	2.6	3.1
Average export	158,786	199,484
Average export per product	78,072	100,406
Average number of years a firm exports to a destination (not necessarily consecutive)	1.28	1.26

extra-EU destinations has been decreasing. While there was a small peak in exporting firms in 2007 and 2008, we see a clear negative effect of the financial crisis and the Great Trade Collapse, and the number of Belgian exporting firms does not recover to pre-crisis levels in the sample period. While the total number of firms has steadily been decreasing over time, the importance of trade agreements has been increasing. Figure 4.1 presents the evolution of number of firms exporting to destinations with a trade agreement only, to destinations without a trade agreement only, and mixed. We confirm that a majority of Belgian firms never exports to a destination with which the EU has a trade agreement. This share has declined over the sample period, from 51% in 2002 to 41% in 2014. This decline can of course be explained by an increase in the number of trade agreements in this time period. A small number of firms exports only to destinations with a trade agreement. These are mainly single-destination firms.

Relating the number of export destinations a firm exports to, with firm characteristics, we find that older and more successful firms tend to serve more destinations: firms exporting to more destinations, tend to be more productive (higher added value per worker), have more employees, make more profit, and be older than firms serving less destinations. We can also compute these summary statistics only for firms that export to at least one

export destination with a trade agreement. However, as firm characteristics are firm-time specific, and not firm-destination-time specific, comparing these statistics to table 4.3 only makes sense for single destination firms. Comparing the firm characteristics for firms exporting to one destination with a trade agreement to all single destination firms, we find that firms that export to an FTA destination have less employees: they employ on average 31 employees, or 93% of the employees employed on average by the full sample of single destination firms. Moreover, we find that these firms are a lot more profitable: they report on average profits of 560,666 euros, this is 161% of the profits reported by the full sample of single destination firms. Finally, comparing added value per worker and age of the company, we do not find notable differences between single destination firms exporting to FTA countries and all single destination firms. As these descriptive statistics do not control for any confounding factors, they should be interpreted cautiously. However, this is not what we expect to find based on the literature, which predicts that the larger and more productive firms will take (more) advantage of trade liberalization opportunities.

Comparing destinations with trade agreements to destinations without trade agreements, we find that the average firm tends to export more on average to destinations with a trade agreement than without, both in number of products (3.1 products per firm versus 2.6) as in export value. This is consistent with the theoretical model of Eckel and Neary (2010), which predicts that firms will sell a larger range of products in FTA markets compared to non-FTA markets. Export spells tend to be of similar length to both kinds of destinations.

4.5 Baseline model

Comparing key indicators for Belgian exports to destinations with and without a trade agreement, already sheds some light on the impact of trade agreements on Belgian exporting firms. However, it is important to control for confounding factors. Destinations with and without trade agreements are not necessarily similar in terms of country size, distance and shared history, all factors that are known to influence how much countries will trade with each other. While there is already an extensive literature on how to estimate the impact of trade agreements on the country-level (see for example Head and Mayer (2014) for a comprehensive overview of the latest literature on the gravity equation), this is not the case for estimating it on the firm-level. Therefore, we will use the country-level gravity literature as a guideline, and try to translate it to the firm-level.

We start by estimating a standard baseline gravity model, describing the average partial equilibrium impact of trade agreements on firm exports.

We augment the gravity equation with firm characteristics to control for firm-specific variation.

We estimate the following equation:

$$lnX_{fpjt} = \beta_0 + \beta_1 TA_{jt} + \beta_s ln\mathbf{firmchar}_{ft} + \beta_m \mathbf{covariates}_{j/jt} + \varepsilon_{fpjt} \quad (4.4)$$

with f indexing firms, p products, j export destinations and t years. X denotes exports flows, TA a dummy taking value 1 if Belgium has an active FTA or CU with this destination, **firmchar** a vector denoting various firm characteristics, **covariates** a vector denoting standard gravity covariates and ε error. Following the literature, we consider a wide range of firm-specific characteristics in the regression[6] and Nitsch and Pisu (2008) include TFP and the log of number of FTE employees and alternatively value added per worker and capital intensity per worker. We include added value per worker, firm size, the number of full-time equivalent employees, profits/losses and age of the company. As standard gravity covariates, we include (the log of) nominal GDP of the partner country, (the log of) weighted distance between Belgium and the partner country, common language spoken in both countries by at least 20% of the population and colonial ties. As Belgium only shares borders with countries of the European Union, we do not include a dummy for contiguity in our analysis.

Results are presented in table 4.5. We start by estimating equation 4.4 as is (column (1)), and then gradually add a more intricate matrix of fixed effects (columns (2)-(6)). Note how important the effect is of the particular fixed effects used. Several variables switch signs or become (in)significant when using a different fixed effects structure. Especially the specification without any fixed effects seems unreliable. The coefficient for distance has the wrong sign when compared to theoretical and empirical results from the gravity literature, suggesting that this specification might suffer from omitted variable bias. Adding year, firm and product fixed effects (column (2)) or year and firm-product fixed effects (column (3)) seems to alleviate the problem. All gravity coefficients now have the expected sign. Adding firm-destination fixed effects and/or firm-year fixed effects (columns (4)-(6)) does not alter the results much. Some coefficients increase in magnitude, but overall the results are quite stable.

Looking at the coefficient for trade agreements, we can conclude that the average trade agreement has a small, but positive effect on firm-level exports. Specifications including different fixed effect structures have positive effects,

[6]For example, Van Hove and Abraham (2011) include the number of full-time-equivalent employees, value added per worker, labour remuneration and machinery per worker and immaterial fixed assets per worker as firm characteristics, while Söderlund and Tingvall (2014) includes MNE status, firm size and TFP, Abraham, Studnicka, and Van Hove (2015) include value added per worker, number of FTE employees, age and average wage per worker, Bas (2012) includes firm size (measured as number of employees), productivity, skill intensity and a dummy for multinational.

Table 4.5: Baseline model: impact of trade agreements on firm exports.

	(1) Ln(exp)	(2) Ln(exp)	(3) Ln(exp)	(4) Ln(exp)	(5) Ln(exp)	(6) Ln(exp)
TA	-0.19***	0.00	0.02**	0.05***	0.03*	0.01
	(0.018)	(0.009)	(0.010)	(0.020)	(0.018)	(0.017)
Ln(av pw)	0.44***	-0.04***	-0.01	-0.05***	0.00	
	(0.042)	(0.013)	(0.011)	(0.018)	(0.010)	
Ln(firmsize)	0.20***	0.36***	0.38***	0.36***	0.39***	
	(0.021)	(0.006)	(0.006)	(0.008)	(0.010)	
Ln(employees)	-0.26***	-0.13***	-0.05***	-0.15***	0.01	
	(0.022)	(0.015)	(0.013)	(0.020)	(0.013)	
Ln(profits)	-0.02***	0.00	-0.00	0.00	0.00	
	(0.003)	(0.001)	(0.000)	(0.001)	(0.000)	
Ln(age)	0.07**	0.01	-0.05**	-0.02	-0.04**	
	(0.030)	(0.026)	(0.021)	(0.033)	(0.021)	
Ln(GDP)	0.07***	0.18***	0.28***	0.22***	0.36***	0.33***
	(0.006)	(0.004)	(0.005)	(0.018)	(0.015)	(0.016)
Ln(dist)	0.02	-0.05***	-0.15***			
	(0.015)	(0.005)	(0.006)			
Comlang	0.07***	0.01*	0.04***			
	(0.015)	(0.007)	(0.008)			
Colony	0.10**	0.36***	0.61***			
	(0.039)	(0.041)	(0.070)			
Fixed effects	no	t, f, p	t, fp	t, fj	t, fp, fj	ft, fp, fj
Observations	2 488 543	2 480 473	2 238 765	2 410 917	2 179 764	2,150,303

With TA trade agreement, $av\ pw$ added value per worker, GDP nominal GDP, $dist$ weighted distance, $comlang$ common language (spoken by at least 20% of the population) and $colony$ colonial ties. Regressions are performed on the $fpjt$-level, with f denoting firms, p CN8 products concorded over time, j destinations and t years. Clustered standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

but they are not all statistically significant. While the coefficients in the specifications with t, f, p fixed effects and ft, fp, fj fixed effects are close to zero and statistically significant, the coefficients for columns (3), (4) and (5) are statistically significant and range from 0.02 to 0.05. This implies that for these specifications, trade agreements are correlated with an increase in firm-level export flows per product to a destination with a trade agreement with $e^{(0.02)} - 1 = 2\%$ to $e^{(0.05)} - 1 = 5\%$ compared to a destination without a trade agreement.

These positive results are in line with the predictions discussed in section 4.2. While these effects might seem small in magnitude compared to studies on the aggregate level (see chapter 2), they are in line with effects found in the firm-level literature. Using the euro as a natural experiment, Berthou and Fontagné (2013) find that the euro was associated with an increase in firm exports of 5% for France, while Nitsch and Pisu (2008) find - using Belgian firm-level data - that the euro increased intra-EMU trade by about 5 to 10%, but the results are "statistically fragile".

Test for exogeneity of TA. Our specification assumes that the dummy for trade agreement is exogeneous. To test this assumption, we include one- and five-year leads of the TA dummy into our baseline model (Wooldridge, 2010). Moreover, guided by the results from chapter three, we also test

the exogeneity of the TA dummy using the different stages of the lifetime of a trade agreement. We hence include one- and five-year leads of the $Stage1$ dummy. Results are presented in table 4.16 in the appendix. We find that the coefficients for the lead of TA and $Stage1$, respectively, are not statistically significant in any of the specifications of our model. This suggests that the dummies describing trade agreements are exogeneous in our model.

Robustness check 1. While it has been shown for example in Soete and Van Hove (2017) and Baier, Bergstrand, and Feng (2014) that PTAs have no effects on trade flows, we do include a dummy for PTAs in our analysis as a robustness check. Results are presented in table 4.17 in the appendix. We find that the coefficient for the PTA dummy is not statistically significant. This is irrespective of the fixed effects structure used.

Robustness check 2. The firm characteristics in our baseline model might be correlated with exports. To test whether there is an endogeneity bias, we rerun our baseline model, but now include the firm characteristics of year $t-1$ instead of year t into the regressions. Results are presented in table 4.18 in the appendix. Results are very similar to the baseline model, but the effects of trade agreements on firm-level exports are slightly larger. Results for trade agreements for the specifications with (some) fixed effects range from 2% to 7%.

As in chapter 2, we will now allow for more heterogeneity of the effect of trade agreements on firm-level exports. We start by zooming in on the timing of trade policy effects, and look at anticipation as well as lagged effects. After that, we look at firm heterogeneity and explore whether firms with different characteristics react differently to trade agreements. Finally, we look at the impact of trade agreements on the margins of trade.

4.6 Timing of trade policy effects

The day a trade agreement enters into force is preceded by a (long) process of negotiations, informal and formal meetings, legislative acts, signature ceremonies and sometimes even protests, document leaks and rumors. It is therefore not surprising that trade agreements between European countries and the rest of the world have anticipation effects, and trade flows already start increasing before trade agreements enter into force officially (see chapter 3).

Once a trade agreement enters into force, the process of opening up trade in both countries is not finished either. It typically takes up to five or ten years before all products are completely liberalized. Moreover, it takes time for the terms of trade of a country to adjust. This explains why Baier, Bergstrand, and Feng (2014), Soete and Van Hove (2017), and Magee

(2008) and many others find that trade agreements keep on stimulating trade up to five or ten years after their entry into force.

We follow the method of Baier, Soete, and Van Hove (2016) outlined in chapter three and augment the gravity equation with five dummies for the different stages in the lifetime of an EIA: announcement (stage 1), start negotiations (stage 2), conclusion of negotiations (stage 3), signature (stage 4), provisional application of the agreement (stage 5) and official entry into force (stage 6). Results are presented in table 4.6. To look at the impact of trade agreements five years after entry force, we follow the method used in Baier, Bergstrand, and Feng (2014) and add five-year lagged effects[7]. Note that adding these lags makes us loose more than three quarters of our observations, so it is advisable to interpret the results with caution. Results are presented in table 4.7. We use the same structure of fixed effects as in our baseline model in both sets of regressions.

We focus on the results using a more rigid fixed effects structure (i.e. columns (5) and (6)), as these will suffer less from omitted variable bias and are therefore more correct. We confirm that firms anticipate trade agreements. Trade flows start increasing once the negotiations start (stage 2). The conclusion of the negotiations (stage 3) is also correlated with increased trade flows. After that, trade seems to return to its base level, only to rise again after the (provisional) entry into force of the agreement (stage 5 and 6).

Results for the timing of trade policy effects are less clear-cut. While trade agreements seem to have no effects on trade flows after five years when using an extensive matrix of fixed effects (columns (5)-(6)), they do seem to have a small positive impact when using a slightly lighter structure of fixed effects (columns (3)-(4)).

To study the effect of the different stages on the number of firms exporting to a market, we estimate a similar model as our baseline model, but now use the log of the number of firms exporting to a destination as our dependent variable. Results are presented in 4.8. Focusing on the more robust specification (columns (1) and (4)), we find that the number of firms exporting to a destination starts increasing from the moment a trade agreement is announced. The effect is only statistically significant at the 10% threshold though. Coefficients for stages 2 through 6 are more precisely estimated, and we find that the number of Belgian firms exporting to a destination with a (potential) trade agreement steadily increases throughout the lifetime of the trade agreement, reaching a peak after negotiations are concluded. Once the negotiations are concluded, the number of firms exporting to a destination with a (future) trade agreement is 12% higher on average compared to destinations without. These results support the

[7] As our sample period is only twelve years, it is not sensible to add ten-year lags, as this would make us loose ten years of data, or almost all our data.

Table 4.6: Anticipation effects of trade agreements.

	(1) Ln(exp)	(2) Ln(exp)	(3) Ln(exp)	(4) Ln(exp)	(5) Ln(exp)	(6) Ln(exp)
Stage 1	-0.21***	-0.07***	-0.10***	0.04***	0.02	0.01
	(0.036)	(0.017)	(0.018)	(0.014)	(0.013)	(0.013)
Stage 2	-0.42***	0.00	-0.02*	0.09***	0.05***	0.04***
	(0.022)	(0.008)	(0.009)	(0.014)	(0.010)	(0.011)
Stage 3	-0.69***	-0.03	-0.06**	0.08***	0.05***	0.03**
	(0.047)	(0.019)	(0.022)	(0.016)	(0.014)	(0.014)
Stage 4	-0.47***	0.01	0.01	0.06***	0.02	-0.00
	(0.064)	(0.026)	(0.034)	(0.017)	(0.014)	(0.014)
Stage 5 and 6	-0.54***	-0.02*	-0.01	0.16***	0.08***	0.02
	(0.022)	(0.009)	(0.011)	(0.019)	(0.015)	(0.015)
Ln(av pw)	0.43***	-0.04***	-0.01	-0.05***	0.00	
	(0.041)	(0.013)	(0.011)	(0.018)	(0.010)	
Ln(firmsize)	0.20***	0.36***	0.38***	0.36***	0.39***	
	(0.020)	(0.006)	(0.006)	(0.008)	(0.010)	
Ln(employees)	-0.26***	-0.13***	-0.05***	-0.15***	0.01	
	(0.021)	(0.015)	(0.013)	(0.020)	(0.013)	
Ln(profits)	-0.02***	0.00	-0.00	0.00	0.00	
	(0.003)	(0.001)	(0.000)	(0.001)	(0.000)	
Ln(age)	0.07**	0.01	-0.05**	-0.01	-0.04**	
	(0.030)	(0.026)	(0.021)	(0.033)	(0.021)	
Ln(GDP)	0.03***	0.18***	0.28***	0.23***	0.36***	0.33***
	(0.006)	(0.004)	(0.005)	(0.018)	(0.015)	(0.016)
Ln(dist)	-0.02	-0.05***	-0.15***			
	(0.013)	(0.005)	(0.006)			
Comlang	0.12***	0.01*	0.04***			
	(0.014)	(0.007)	(0.008)			
Colony	0.18***	0.35***	0.60***			
	(0.038)	(0.041)	(0.070)			
Fixed effects	no	t, f, p	t, fp	t, fj	t, fp, fj	ft, fp, fj
Observations	2,488,543	2,480,473	2,238,765	2,410,917	2,179,764	215,0303

With *stage* the different stages in the lifetime of a trade agreement, $av\ pw$ added value per worker, GDP nominal GDP, *dist* weighted distance, $comlang$ common language (spoken by at least 20% of the population) and *colony* colonial ties. Regressions are performed on the $fpjt$-level, with f denoting firms, p CN8 products concorded over time, j destinations and t years. Clustered standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

theoretical model of Bergin and Lin (2012) discussed in chapter 3. The model of Bergin and Lin (2012) predicts that new firms will start entering the export market the moment a trade agreement is announced. Firm entry increases steadily during the whole pre-implementation period, to reach its peak the moment the trade agreement enters into force. Though we find that firm entry reaches its peak after the conclusion of the negotiations of the trade agreement and hence not when the trade agreement enters into force, the difference between the coefficients for stage 4 compared to stage 5 and 6 is not statistically significant.

4.7 Trade agreements and firm characteristics

So far, we have calculated the effect of an average trade agreement on the exports of an average firm. However, trade agreements might not have a

Table 4.7: Timing of trade policy effects.

	(1) Ln(exp)	(2) Ln(exp)	(3) Ln(exp)	(4) Ln(exp)	(5) Ln(exp)	(6) Ln(exp)
Stage 1	0.19***	-0.09***	-0.10***	0.10***	0.08***	0.09***
	(0.068)	(0.022)	(0.022)	(0.030)	(0.025)	(0.027)
Stage 2	-0.12***	-0.00	-0.02	0.16***	0.10***	0.09***
	(0.038)	(0.014)	(0.015)	(0.032)	(0.023)	(0.025)
Stage 3	-0.31***	-0.04	-0.06*	0.15***	0.10***	0.08***
	(0.084)	(0.030)	(0.032)	(0.033)	(0.027)	(0.029)
Stage 4	-0.43***	0.06	0.04	0.13***	0.04*	0.03
	(0.072)	(0.047)	(0.055)	(0.038)	(0.025)	(0.027)
Stage 5 and 6	-0.09	-0.01	-0.05*	0.23***	0.07**	0.02
	(0.070)	(0.026)	(0.028)	(0.041)	(0.033)	(0.034)
Lag 5	-0.23***	0.03	0.06*	0.07**	0.03	-0.01
	(0.058)	(0.028)	(0.030)	(0.036)	(0.028)	(0.029)
Fixed effects	no	t, f, p	t, fp	t, fj	t, fp, fj	ft, fp, fj
Observations	400,098	398,212	384,982	388,332	375,061	366,501

With *stage* the different stages in the lifetime of a trade agreement.Regressions include firm characteristics and gravity covariates, but coefficients have been ommitted to save space. Regressions are performed on the $fpjt$-level, with f denoting firms, p CN8 products concorded over time, j destinations and t years. Clustered standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 4.8: Impact of trade agreements on the number of firms exporting.

	(1) Ln(firms)	(2) Ln(firms)	(3) Ln(firms)	(4) Ln(firms)
TA	-0.17***	0.08**		
	(0.059)	(0.034)		
Stage 1			0.22***	0.05*
			(0.059)	(0.034)
Stage 2			0.54***	0.07***
			(0.041)	(0.019)
Stage 3			0.46***	0.08***
			(0.062)	(0.024)
Stage 4			0.27***	0.11***
			(0.075)	(0.022)
Stage 5 and 6			0.09**	0.10***
			(0.045)	(0.025)
Ln(GDP)	0.60***	0.32***	0.61***	0.32***
	(0.008)	(0.033)	(0.007)	(0.033)
Ln(dist)	-0.88***		-0.83***	
	(0.037)		(0.032)	
Comlang	1.07***		0.99***	
	(0.050)		(0.047)	
Colony	1.41***		1.21***	
	(0.074)		(0.075)	
Fixed effects	t	t, j	t	t, j
Observations	2,016	2,026	2,016	2,026

With TA trade agreement, GDP nominal GDP, $dist$ weighted distance, $comlang$ common language (spoken by at least 20% of the population) and $colony$ colonial ties. Regressions are performed on the jt-level, with j denoting destinations and t years. Robust standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

homogeneous impact on all firms, and theoretical models assume that firms are heterogeneous since Melitz (2003). In this section, we will therefore allow trade agreements to have a differential impact on heterogeneous firms. We do this by including interaction terms between the TA dummy and each firm characteristic.

Results are presented in table 4.9. We use the same structure of fixed effects as in our baseline model and again focus on the estimations with a fixed effects structure that controls for more omitted variables. We find that the impact of trade agreements on firm-level exports is mitigated by firm characteristics. In particular, productivity, number of employees, firm size and age of the company seem to negatively influence the positive relationship between trade flows and trade agreements, but the coefficients for productivity and firm size are not statistically significant at the 5% level and they are close to zero. Trade agreements are associated with increases in firm-level exports, but this positive relationship decreases with the number of employees and age. Profits do not seem to alter the impact of trade agreements on trade flows.

To investigate the interplay between firm characteristics and trade agreements further, we estimate quantile regressions. There are two major advantages of using quantile regressions over regressions with interactions. First, we can split up our sample into categories that are meaningful from an economical point of view. Second, we can allow for non-linear relationships between the effects of trade agreements and firm characteristics. This of course comes at the cost of loss of statistical power, as we have to split our sample. Luckily, our sample size is large enough to cope with a reduction of statistical power without too much loss of precision.

Results are presented in table 4.10. As cut-off points for productivity and profits, we use quartiles and deciles of the respective independent variable. For age, we use the following cut-off points: very young <10 years, young 10-19 years, medium 20-29 years, mature 30-39 years and old >40 years[8]; while for firm size, we rely on the definition of small- and medium-sized enterprises by the European Union (Mulhern, 1995), which defines firms with 0-9 employees as micro firms, 10-99 as small, 100-499 as medium-sized, and 500 and over as large. We break up the "small" category into firms with 10-50 employees (small 1) and 50-99 employees (small 2).

We only present results for age and number of employees, as the quantile regressions for productivity, firm size and profits did not reveal a differential impact of trade agreements for these variables. We find that older firms seem to use the opportunities that trade agreements bring, while young firms do not, as the TA coefficient is not significant for younger firms

[8] As these cut-off points are arbitrarily chosen, we redefine the thresholds in a number of different ways. Results are robust to using different cut-off points with respect to number of years and using quartiles of the distribution of age.

and close to zero or slightly negative, while it is positive and statistically significant for older firms. Firms that have been in business for more than 30 years see an average increase in their exports of 9% to 11%. This is more than double the magnitude of the effect of TAs for the whole sample. For firm size, we find that the negative interaction effect is completely driven by a positive relation between trade agreements and trade for small firms: firms with 50 to 99 employees export $100 * (e^{0.12} - 1) = 13\%$ more to destinations with a trade agreement *ceteris paribus*. The impact of trade agreements on firms with more or less employees is not statistically significant. How can we reconcile the findings that it are mainly older and small firms that benefit from trade agreements? Typically older firms are larger in terms of size and number employees. However, calculating the correlations between the various firm characteristics (see table 4.11) reveals that this is not the case for Belgium, as the correlation between age and the number of employees amounts to only 0.20.

Table 4.9: Trade agreements and firm characteristics.

	(1) Ln(exp)	(2) Ln(exp)	(3) Ln(exp)	(4) Ln(exp)	(5) Ln(exp)	(6) Ln(exp)
TA#ln(av pw)	-0.05**	0.04***	0.06***	-0.02	-0.01	-0.00
	(0.023)	(0.010)	(0.011)	(0.016)	(0.011)	(0.011)
TA#ln(employees)	-0.02*	0.01*	0.02***	-0.03***	-0.02**	0.01
	(0.011)	(0.005)	(0.006)	(0.012)	(0.010)	(0.010)
TA#ln(firmsize)	0.02***	0.00	-0.00	-0.01*	0.00	-0.01
	(0.008)	(0.004)	(0.004)	(0.008)	(0.006)	(0.008)
TA#ln(profits)	0.00	-0.00*	-0.00	0.00	0.00	-0.00
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)
TA#ln(age)	-0.02	-0.03***	-0.02**	-0.11***	-0.05***	-0.02
	(0.016)	(0.008)	(0.008)	(0.021)	(0.015)	(0.016)
TA	0.26	-0.50***	-0.68***	0.98***	0.40***	0.21
	(0.248)	(0.105)	(0.120)	(0.196)	(0.146)	(0.145)
Ln(av pw)	0.45***	-0.05***	-0.03***	-0.05**	0.00	
	(0.043)	(0.014)	(0.012)	(0.019)	(0.011)	
Ln(employees)	-0.26***	-0.13***	-0.05***	-0.14***	0.02	
	(0.022)	(0.015)	(0.013)	(0.021)	(0.014)	
Ln(firmsize)	0.19***	0.36***	0.38***	0.36***	0.39***	
	(0.023)	(0.006)	(0.007)	(0.008)	(0.010)	
Ln(profits)	-0.02***	0.00	0.00	-0.00	0.00	
	(0.003)	(0.001)	(0.001)	(0.001)	(0.000)	
Ln(age)	0.07**	0.02	-0.04*	0.01	-0.03	
	(0.031)	(0.026)	(0.021)	(0.035)	(0.022)	
Ln(GDP)	0.07***	0.18***	0.28***	0.20***	0.35***	0.33***
	(0.006)	(0.004)	(0.005)	(0.018)	(0.015)	(0.017)
Ln(dist)	0.02	-0.05***	-0.15***			
	(0.015)	(0.005)	(0.006)			
Comlang	0.07***	0.01*	0.04***			
	(0.015)	(0.007)	(0.008)			
Colony	0.09**	0.35***	0.60***			
	(0.038)	(0.041)	(0.070)			
Fixed effects	no	t, f, p	t, fp	t, fj	t, fp, fj	ft, fp, fj
Observations	2,488,543	2,480,473	2,238,765	2,410,917	2,179,764	2,150,303

With TA trade agreement, $av\ pw$ added value per worker, GDP nominal GDP, $dist$ weighted distance, $comlang$ common language (spoken by at least 20% of the population) and $colony$ colonial ties. Regressions are performed on the $fpjt$-level, with f denoting firms, p CN8 products concorded over time, j destinations and t years. Clustered standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

Table 4.10: Impact of trade agreements on firm exports for different categories of firms.

	Age					**Employees**				
	(1) Very young	(2) Young	(3) Medium	(4) Mature	(5) Old	(6) Micro	(7) Small 1	(8) Small 2	(9) Medium	(10) Large
TA	-0.01	-0.02	-0.04	0.11**	0.09**	-0.01	0.03	0.12**	0.00	0.04
	(0.049)	(0.055)	(0.046)	(0.042)	(0.035)	(0.043)	(0.028)	(0.055)	(0.043)	(0.041)
Ln(av pw)	-0.03*	-0.01	0.01	0.04**	0.06**	0.01	0.02	-0.06*	0.01	0.03
	(0.016)	(0.015)	(0.019)	(0.018)	(0.025)	(0.008)	(0.014)	(0.032)	(0.025)	(0.051)
Ln(firmsize)	0.39***	0.39***	0.36***	0.40***	0.37***	0.41***	0.37***	0.41***	0.39***	0.43***
	(0.014)	(0.012)	(0.018)	(0.017)	(0.021)	(0.005)	(0.008)	(0.017)	(0.030)	(0.023)
Ln(employees)	0.01	0.03	0.07	-0.02	0.06*	-0.01	0.04	-0.26***	0.28***	0.31***
	(0.020)	(0.021)	(0.045)	(0.030)	(0.035)	(0.012)	(0.027)	(0.073)	(0.079)	(0.074)
Ln(profits)	0.00	0.00	0.00**	-0.00	-0.00**	-0.00	-0.00	0.00	0.00	0.00
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
Ln(age)	-0.06	-0.05	-3.59***	-3.49	-1.78	-0.02	-0.07*	0.02	-0.07	-0.37***
	(0.043)	(0.048)	(1.390)	(2.655)	(1.119)	(0.021)	(0.041)	(0.053)	(0.063)	(0.112)
Ln(GDP)	0.31***	0.31***	0.29***	0.36***	0.41***	0.29***	0.38***	0.41***	0.34***	0.46***
	(0.041)	(0.048)	(0.043)	(0.036)	(0.039)	(0.023)	(0.021)	(0.059)	(0.037)	(0.043)
Fixed effects	t, fp, fj	t, fp, fj	t, fp, fj	t, fp, fj	t, fp, fj	t, fp, fj	t, fp, fj	t, fp, fj	t, fp, fj	t, fp, fj
Observations	258,874	219,408	472,631	300,940	232,276	410,100	576,655	323,786	573,391	261,628

With TA trade agreement, $av\ pw$ added value per worker and GDP nominal GDP. Regressions are performed on the $fpjt$-level, with f denoting firms, p CN8 products concorded over time, j destinations and t years. Clustered standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01. Regressions are performed on subsamples of our data, with the following classification for age: Very young <10 years, Young 10-19 years, Medium 20-29 years, Mature 30-39 years and Old >40 years. Slicing firm age using different thresholds results in qualitatively similar results. For number of employees: Micro <10 employees, Small1 10-49 employees, Small2 50-99 employees, Medium 100-500 employees, Large >500 employees.

Table 4.11: Correlations between firm characteristics.

	Av pw	Firmsize	Employees	Profits	Age
Av pw	1.000				
Firmsize	0.055	1.000			
Employees	0.012	0.277	1.000		
Profits	0.086	0.194	0.260	1.000	
Age	0.052	0.056	0.200	0.074	1.000

With *av pw* added value per worker.

Our findings are consistent with Konings and Vandenbussche (2008) and Lileeva and Trefler (2010) who show empirically and theoretically, respectively, that firms respond heterogeneously to changes in trade policy. The former show how firms with low initial productivity ('laggard firms') experience productivity gains in response to trade protection while firms with high productivity ('frontier firms') experience productivity losses. The latter shows how firms with lower labour productivity benefit more from the trade liberalization following the Canada-US FTA than more productive firms. These findings are also consistent with the view of the European Union that trade agreements are particularly important for smaller companies[9]. This because small firms face the same trade barriers as their large peers but they have fewer staff and less money to deal with them. While larger firms have resources to overcome these fixed sunk costs, this is not (always) the case for smaller companies. A removal of (certain) trade barriers is therefore especially for smaller companies an opportunity to start exporting to a new market. However, our results also indicate that more should be done to stimulate very small and micro-sized firms, as these firms do not seem to benefit from trade agreements.

4.8 Trade agreements and margins of trade

Decomposition of Belgian exports into margins of trade

There are a multitude of reasons why trade flows change from year to year. More firms can start exporting, existing firms can start exporting to a new destination or start exporting a new product, etc. In the following section, we will decompose Belgian exports into several margins of trade. We distinguish between two main margins of trade: the intensive margin (IM)

[9]The European Union, and in particular the European Commission, has made this very clear recently in the context of the negotiations of the Transatlantic Trade and Investment Partnership, with the demand to include a separate chapter dedicated to SME issues, and the proposal by the Commission of the new trade and investment strategy "Trade for all", which suggests to include effective SME provisions in future trade agreements (European Commission, 2016a; European Commission, 2016b)

and the extensive margin (EM). The intensive margin of trade describes how much an incumbent company exports to an existing product-destination combination, while the extensive margin describes new export flows. We can decompose the extensive margin of trade further into five submargins. The first extensive margin of trade is the firm margin, when a firm starts exporting for the first time. Once firms are exporting, they can expand their export activities into different markets and products. A firm can start exporting a product it was already exporting to a new destination. We will call this market diversification. Or a firm can start exporting a new product to a destination it was already exporting to (product diversification). A firm can also start exporting a new product to a new market (market-product diversification). Finally, a firm can find a new application for one of its existing products, by starting to export it to a destination it already exports other products to (new application). Figure 4.2 presents a schematic overview of the different margins of trade.

We can now decompose Belgian exports into the different margins of trade. Figure 4.3 presents the decomposition for 2014. The margins are calculated by firm by destination, and then averaged over all firms. We decompose Belgian exports both in terms of the number of products exported (left), as well as the export value (right). Decompositions for all

Figure 4.2: Schematic overview of the margins of trade.

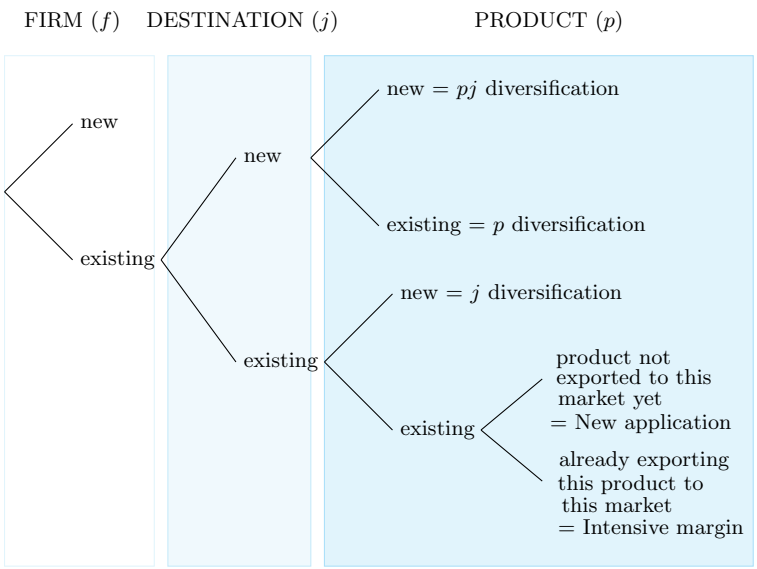
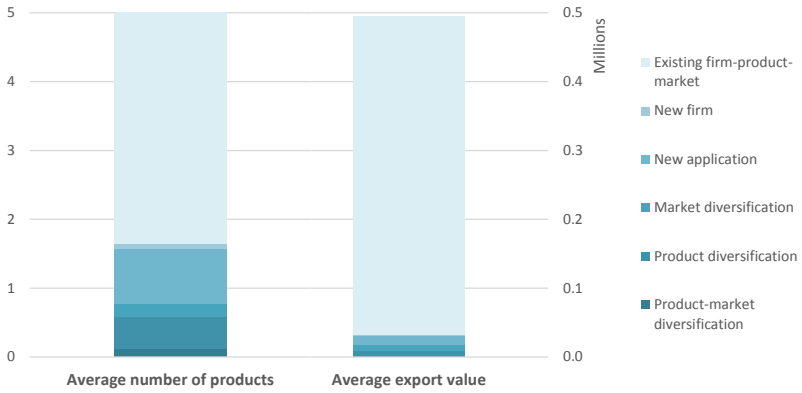


Figure 4.3: Product-destination margins by firm for 2014.



years can be found in table 4.15 in the appendix. Note that we do not consider re-entries as new entries.

The average firm exports five products in 2014. This is a big increase compared to 2002, when the average firm exported only 2.6 products. Exporting existing products to existing markets accounts for the lion's share of exports of incumbent firms. This in terms of the number of products as well as the export value. The average firm exports 67% of all its products to existing product-destination links.[10] This number is even higher in export value: 93% of all exports are repeated transactions, i.e. firms already exported the same product to the same destination.

The remaining exports consist of extensive margin exports. Product diversification and new applications are the most important extensive margins, with the average firm exporting 0.44 new products to existing destinations in 2002 as well as 0.44 new applications of products. While both margins were equally important in 2002, the average firm has doubled the number of products it finds new applications for, while product diversification has stayed rather constant. We see a different picture when we look at export value. Both product diversification and new applications have declined strongly over time (with the export value in 2014 being less than 2/3 of the export value in 2003[11]). Market diversification is only half as important as product diversification in number of products (the average firm starts exporting 0.19 existing products to a new destination in 2014), but it accounts for more export value (9,106 euros). The number of products and

[10] Note that this does not imply that firms export these products to these destinations for consecutive years. Rather it signals that firms exploit the experience they have with particular products on particular markets and repeat transactions they made in the past.

[11] The export value for the new application margin in 2002 is a strong outlier.

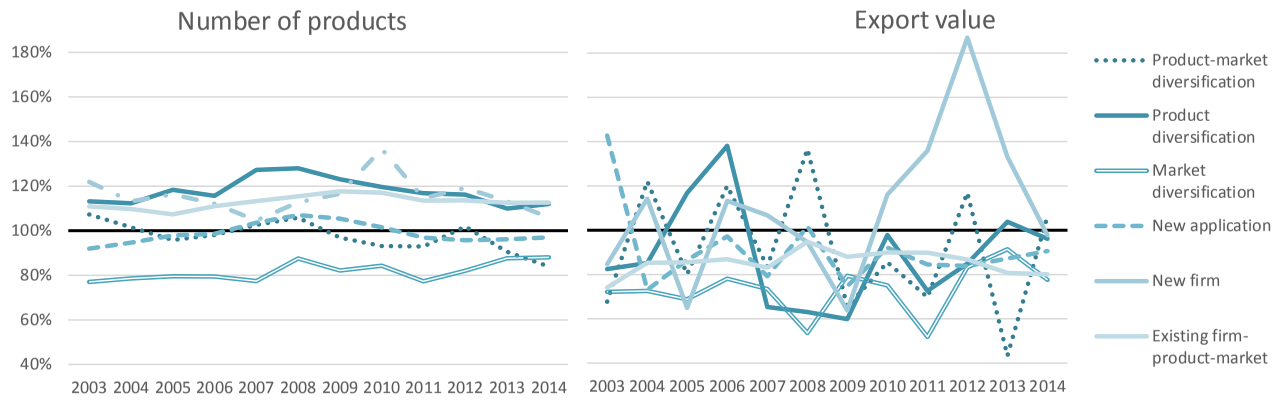
the export value of market diversification stays rather constant throughout the sample period. New firms and product-market diversification only account for a small fraction of export products (0.06 and 0.12 products, respectively) and export value. This is not surprising, as these activities represent the activities with the highest risk. As has been pointed out by Melitz (2003) and many others, starting to export is a risky business as it is accompanied by high fixed costs.

We can repeat this decomposition only for destinations with which Belgium has a trade agreement. Comparing both sets of margins yields interesting results. Figure 4.4 depicts the evolution of the ratio of each set of margins. Note that while the picture is rather clear-cut in terms of the number of exported products, it is less so in export value. Comparing the intensive margin of both sets of destinations, we find that the average firm exports more products to destinations with a trade agreement compared to all destinations. The average export value per product is lower, however, resulting in exports to destinations with an FTA being worth 20% less than exports to the average destination. Moreover, destinations with trade agreements seem to be particularly interesting when firms want to launch a new product, but not so much for existing products. The average firm tries out more new products on markets with a trade agreement when it is already exporting other products to that market compared to all markets (product diversification). If the company is not exporting to that destination yet, there is not really a difference between destinations with FTAs and all destinations for the introduction of new products. This both in number of products and export value. Firms that start exporting for the first time export more products to destinations with an FTA compared to all destinations, and this is also translated into a higher export value for most of the years of our time period. Finally, firms start exporting less existing products to an FTA destination, both when they are already present on that market and when they are not.

We also find that there is a lot of product churning. 42-45% of all firms in the sample change their portfolio of destination markets every year, while 49-59% of all firms in the sample change their portfolio of products every year.[12]

[12]To calculate proportions, we divide the number of firms changing their portfolio by all firms in the sample for that year. We do not consider re-entering a destination market as changing the destination portfolio of a firm.

Figure 4.4: Comparing the different margins of trade by firm for destinations with a trade agreement to all destinations.



Finally, figures 4.5 and 4.6 show the evolution of the entry and exit of firms, respectively, into new destinations and relate this to the number of years before/after the entry into force of a trade agreement. Results are scaled by the average number of firms entering and exiting destination markets, and so control for the strong upward trend of increasing firm dynamics. After this, an index is calculated, taking the date of entry into force as 1. We find that firm dynamics to a destination increase when an FTA with that market enters into force. We find that more firms will start exporting to this destination for the first time, yet this does not necessarily mean that the total number of Belgian firms exporting to this destination increases as the number of firms exiting also increases.

Figure 4.5: Entry of firms into new destination before and after entry into force of a trade agreement.

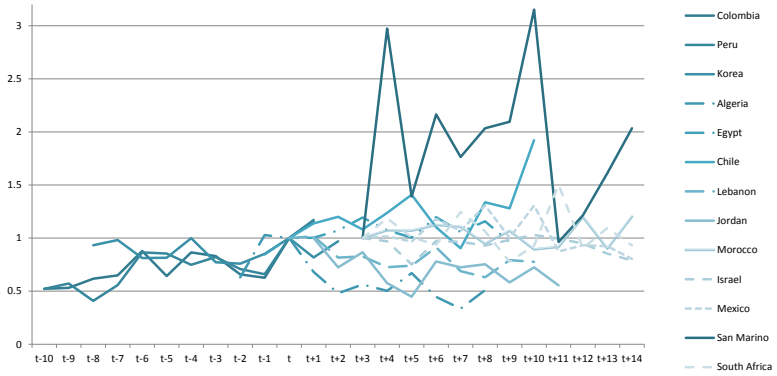
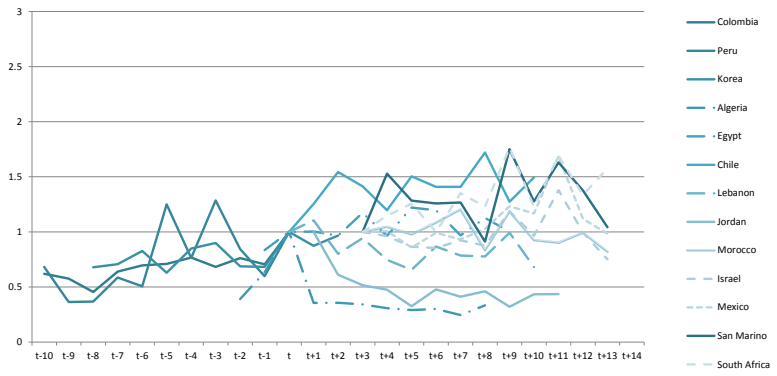


Figure 4.6: Exit of firms of destination before and after entry into force of a trade agreement.



Impact of trade agreements on the margins of trade

As destinations with trade agreements are not necessarily comparable to destinations without trade agreements, differences between trade to both types of destinations could be caused by other factors. In order to control for these factors, we regress the different margins of trade on our control variables. We include fixed effects in all our specifications, as we have shown that the results without fixed effects are not very stable.

In order to include firm characteristics as well as fixed effects, we need to estimate our regression on the firm-product-destination-year level. This implies that our margins take the form of dummies indicating whether or not a certain transaction belongs to a certain margin or not. Our regression takes the following form:

$$margin = \beta_0 + \beta_1 TA_{jt} + \beta_s ln\mathbf{firmchar}_{ft} + \beta_m \mathbf{covariates}_{j/jt} + \varepsilon_{fpjt} \quad (4.5)$$

with *margin* a binary variable describing one of the following product margins: product-destination diversification, product diversification, destination diversification or new application.[13]

Given that our dependent variable can take only value zero or one, a logit or probit estimator would be the best estimator, as they avoid the problem of predicting probabilities outside of the 0-1 range as linear probability models do. However, a linear probability model addresses the incidental parameters problem that non-linear fixed effects estimators suffer from. We therefore estimate equation 4.5 using ordinary least squares (OLS). Similar specifications have also been used by Bernard and Jensen (2004) and Muûls and Pisu (2009).

Table 4.12 presents the results. Looking at firm characteristics, we find that productivity does not seem to be related to diversification, but more productive firms do seem to find more new applications for their existing products, *ceteris paribus* . Firm size affects diversification negatively, while it strongly boosts new applications. Profits are once more unrelated to firm-level trade. Finally, older firms seem to diversify their portfolio less.

Looking at the impact of trade agreements, we find that firms start to export more new products to a market with a trade agreement compared to the average market. This regardless of whether the firm is already active on that market (product diversification) or not (product-market diversification). This is exactly what we expected based on our theoretical framework and is also consistent with the theoretical model of Eckel and Neary (2010), which predicts that firms will expand their range of products in markets with trade agreements.

[13] See section 4.2 for a schematic overview of the margins.

Table 4.12: Trade agreements and margins of trade.

	Product-dest. diversification			**Product diversification**			**Destination diversification**			**New application**		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
TA	-0.003***	0.005**	0.004	0.005***	-0.002	0.022***	-0.036***	-0.022***	-0.022***	-0.039***	0.007	0.004
	(0.000)	(0.002)	(0.002)	(0.001)	(0.004)	(0.004)	(0.001)	(0.003)	(0.003)	(0.002)	(0.005)	(0.005)
Ln(av pw)	-0.004	0.006*	-0.004	-0.001	-0.004*	-0.004	0.021***	0.024***	0.022***			
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.007)	(0.007)	(0.007)
Ln(firmsize)	-0.016***	-0.014***	-0.016**	-0.024***	-0.004	-0.024***	0.002	-0.012***	-0.012***	0.033***	0.032***	0.027***
	(0.006)	(0.005)	(0.006)	(0.005)	(0.005)	(0.006)	(0.003)	(0.002)	(0.003)	(0.006)	(0.006)	(0.006)
Ln(profits)	0.000	0.000	0.000	0.003**	0.000	0.003*	-0.001	0.001	0.001	-0.001	-0.001	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)	(0.003)	(0.003)
Ln(age)	-0.034***	-0.037***	-0.030***	-0.047***	0.003	-0.050***	-0.016***	-0.048***	-0.055***	0.021**	0.009	0.001
	(0.006)	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)	(0.005)	(0.006)	(0.009)	(0.008)	(0.010)
Ln(GDP)	-0.002***	-0.009***	-0.006***	0.002***	0.022***	0.036***	-0.019***	-0.053***	-0.057***	-0.023***	-0.001	-0.016***
	(0.000)	(0.002)	(0.002)	(0.000)	(0.003)	(0.003)	(0.001)	(0.002)	(0.003)	(0.001)	(0.004)	(0.004)
Fixed effects	t, fp	t, fj	t, fp, fj	t, fp	t, fj	t, fp, fj	t, fp	t, fj	t, fp, fj	t, fp	t, fj	t, fp, fj
Observations	1,791,141	1,931,352	1,737,389	1,791,141	1,931,352	1,737,389	1,791,141	1,931,352	1,737,389	1,791,141	1,931,352	1,737,389

With TA trade agreement, $av\ pw$ added value per worker and GDP nominal GDP. Regressions are performed on the $fpjt$-level, with f denoting firms, p CN8 products concorded over time, j destinations and t years. Dependent variables are indicator variables, taking value 1 if observation belongs to the corresponding margin. Clustered standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01. Results without fixed effects and results including t, f, p fixed effects are omitted due to space constraints.

If firms are not yet active on the market, then a trade agreement will not stimulate to start exporting to that market with existing products (market diversification), rather trade agreements discourage firms slightly to do so as the coefficient for TA is negative and statistically significant. This might indicate that trade agreements increase competition on the export market, and hence firms will not pay the fixed cost to start exporting if they do not have any experience yet on that market. The presence of trade agreements does not seem to encourage firms to find new applications for existing products, as the coefficient for TA is not significant in columns (11) and (12), and even slightly negative and statistically significant in column (10).

Finally, we estimate the effect on the intensive margin. Results are presented in table 4.13. We find that trade agreements increase the intensive margin, with firms exporting 4% to 5% more on average per product to a destination with a trade agreement compared to a destination without a trade agreement.

Table 4.13: Trade agreements and the intensive margin of trade.

	(1) IM	(2) IM	(3) IM
TA	0.00	0.05***	0.04**
	(0.006)	(0.016)	(0.017)
Ln(av pw)	-0.05***	-0.01**	
	(0.006)	(0.006)	
Ln(firm size)	0.50***	0.50***	
	(0.003)	(0.004)	
Ln(employees)	-0.15***	-0.06***	
	(0.008)	(0.008)	
Ln(profits)	0.00***	0.00**	
	(0.000)	(0.000)	
Ln(age)	-0.05***	-0.07***	
	(0.013)	(0.014)	
Ln(GDP)	0.20***	0.34***	0.35***
	(0.007)	(0.006)	(0.002)
Ln(dist)	-0.13***		
	(0.002)		
Comlang	0.05***		
	(0.006)		
Colony	0.30***		
	(0.013)		
Fixed effects	f,t	fj,t	fj,ft
Observations	692,679	607,783	561,815

With TA trade agreement, $av\ pw$ added value per worker and GDP nominal GDP. Regressions are performed on the fjt-level, with f denoting firms, j destinations and t years. Clustered standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

4.9 Conclusion

This paper explores the impact of trade agreements on firm-level exports. As such, this chapter complements chapter two and three of this dissertation that studied the effects of trade agreements on the country- and product-level. We use a rich panel dataset on Belgian exporting firms for the period 2002-2014 which includes firm-product-destination-level exports and firm characteristics.

We confirm the trade creating effects of EU trade agreements on Belgian firms. Firms export on average 4% more of a given product to a destination with a trade agreement compared to a destination without a trade agreement.

We also confirm the anticipation effects of trade agreements. Firms do not wait until a trade agreement enters into force officially to react. But rather, they anticipate trade agreements, and already start exporting more once the respective representatives of the respective governmental bodies start negotiating the trade agreement. Trade agreements also increase firm entry into markets before the trade agreement have entered into force. The number of firms exporting to a destination with a (potential) trade agreement starts increasing gradually from the moment agreements are announced and the number of firms exporting to that destination reaches a peak after the conclusion of the negotiations of the agreement. This suggests that firms are forward-looking and that there might be first-mover advantages. The number of Belgian firms exporting to destinations with trade agreement is on average 8 to 11% higher compared to destinations without a trade agreement, suggesting that trade agreements are an effective policy tool to remove barriers for firms to export.

Yet, the effects of trade agreements are not homogeneous. Different types of firms react differently to trade agreements. In contrast to the commonly held view that the largest and most productive firms are the firms who benefit the most from FTAs, we find that especially firms with 50 to 99 employees tend to take advantage of the opportunities presented by trade agreements, as well as older firms (i.e. firms that have existed for 30 years or more). Very small and micro-sized firms, however, do not seem to benefit from trade agreements. The productivity and profitability of firms does not mediate the impact trade agreements have on firms. This underutilised export potential of very small and micro-sized firms presents an opportunity for the Belgian government to support and stimulate these firms to explore the possibilities that trade agreements can offer.

Finally, we find that firms expand their range of products in markets with trade agreements. Firms start to export new products more often to a market with a trade agreement compared to without. This regardless of whether the firm is already active on that market (product diversification)

or not (product-market diversification). However, if firms are not yet active on the market, then the probability of a firm starting to export to that market with existing products is lower if there is a trade agreement (market diversification). This might indicate that trade agreements increase competition on the export market, and hence firms will not pay the fixed cost to start exporting if they do not have any experience yet on that market.

4.10 Appendix

Table 4.14: Number of observations with firm characteristics that satisfy the selection criteria.

Year	Total active firms	Firms for which we keep observations				Total selected firms
		Value added	FTE employees	Profits/ losses	Age	
2002	19544	14193	10350	10401	15176	7003
2003	18749	13914	10104	10218	14730	7110
2004	18541	13970	10091	10819	14748	7550
2005	18568	14101	10138	10948	14810	7672
2006	18933	14370	10138	11500	15074	7896
2007	19844	15083	10686	12161	15773	8465
2008	20440	15216	10940	11326	16073	7841
2009	18994	14367	10540	10249	15318	7156
2010	18325	9590	7231	7546	10127	5534
2011	16721	12643	9318	9809	13327	7006
2012	17900	13738	9840	10335	14513	7071
2013	17717	13549	9733	10423	14422	7168
2014	17326	11852	8631	9522	12543	6704

For the number of employees, we only consider firms with at least one employee. For value added, age and fixed assets we retain firms with non-missing values greater than zero, while for profits/losses we keep non-missing observations.

Table 4.15: Decomposition of Belgian exports into different margins of trade.

a) Number of products

Year	Product-market divers.	Product divers.	Market divers.	New application	New firm	Existing firm-product-market
2003	0.16	0.44	0.25	0.44	0.17	1.1
2004	0.12	0.38	0.22	0.45	0.13	1.3
2005	0.11	0.42	0.20	0.58	0.12	1.5
2006	0.10	0.34	0.18	0.50	0.13	1.7
2007	0.14	0.47	0.20	0.60	0.15	1.8
2008	0.17	0.58	0.21	0.71	0.13	1.9
2009	0.16	0.57	0.20	0.79	0.09	2.2
2010	0.17	0.58	0.21	0.94	0.12	2.4
2011	0.11	0.48	0.18	1.27	0.14	3.2
2012	0.14	0.48	0.21	0.81	0.11	2.9
2013	0.10	0.46	0.21	0.83	0.10	3.1
2014	0.12	0.47	0.19	0.81	0.06	3.4

b) Export value

Year	Product-market divers.	Product divers.	Market divers.	New application	New firm	Existing firm-product-market
2003	3845	10272	10299	71080	7151	284345
2004	3652	9578	10648	22641	5030	302567
2005	3175	10630	7901	17725	8736	350352
2006	3566	11910	9939	17443	5382	361933
2007	6829	12920	11174	18523	5725	365118
2008	32230	18573	10725	15680	4345	239353
2009	4626	12408	6598	16133	6948	246297
2010	5596	11032	9115	21215	8713	310207
2011	3029	13169	11238	34392	4157	434295
2012	3580	6558	9428	17117	6468	449928
2013	5904	8783	16035	15884	6602	426062
2014	2484	6167	9106	13336	1593	462057

With *divers.* denoting diversification. See text for the exact definition of the different margins. Values are simple averages by firm by destination, averaged over all firms.

Table 4.16: Endogeneity test.

	(1) Ln(exp)	(2) Ln(exp)	(3) Ln(exp)	(4) Ln(exp)	(5) Ln(exp)	(6) Ln(exp)
Set 1						
F.TA	0.24	-0.01	-0.05	-0.04	-0.02	-0.01
TA	-0.42**	0.04	0.09***	0.11***	0.07**	0.05*
Ln(av pw)	0.58***	-0.04**	-0.01	-0.06**	0.01	
Ln(firmsize)	0.22***	0.45***	0.46***	0.47***	0.50***	
Ln(employees)	-0.29***	-0.12***	-0.03*	-0.16***	0.03*	
Ln(profits)	-0.02***	0.00	0.00	0.00	0.00	
Ln(age)	0.17***	-0.03	-0.05*	-0.06	-0.01	
Ln(GDP)	0.10***	0.26***	0.36***	0.34***	0.47***	0.45***
Ln(dist)	0.02	-0.08***	-0.17***			
Comlang	0.08***	-0.00	0.00			
Colony	0.29***	0.49***	0.75***			
Set 2						
F.Stage 1	0.00	-0.05	-0.07	-0.02	-0.05	-0.06
Stage 1	-0.28***	-0.04	-0.05	0.04**	0.01	-0.01
Stage 2	-0.44***	-0.01	-0.05***	0.05***	0.01	-0.02
Stage 3	-0.78***	-0.01	-0.04	0.07***	0.03	0.00
Stage 4	-0.32***	0.01	-0.01	0.08***	0.03	-0.01
Stage 5 and 6	-0.51***	0.00	-0.01	0.17***	0.06***	0.02
Ln(av pw)	0.58***	-0.04**	-0.01	-0.06**	0.01	
Ln(firmsize)	0.23***	0.45***	0.46***	0.47***	0.50***	
Ln(employees)	-0.29***	-0.12***	-0.03*	-0.16***	0.03*	
Ln(profits)	-0.02***	0.00	0.00	0.00	0.00	
Ln(age)	0.17***	-0.03	-0.04*	-0.06	-0.01	
Ln(GDP)	0.06***	0.26***	0.35***	0.34***	0.46***	0.45***
Ln(dist)	-0.01	-0.09***	-0.17***			
Comlang	0.11***	-0.00	0.01			
Colony	0.39***	0.48***	0.75***			
Fixed effects	no	t, f, p	t, fp	t, fj	t, fp, fj	ft, fp, fj
Observations set 1	1,138,563	1,135,409	1,096,348	1,115,698	1,078,631	1,059,443
Observations set 2	1,138,563	1,135,409	1,096,348	1,115,698	1,078,631	1,059,443

With TA trade agreement, $av\ pw$ added value per worker, GDP nominal GDP, $dist$ weighted distance, $comlang$ common language (spoken by at least 20% of the population) and $colony$ colonial ties. Regressions are performed on the $fpjt$-level, with f denoting firms, p CN8 products concorded over time, j destinations and t years. Clustered standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01. Using five-year leads (F5) instead of 1-year leads (F) yields very similar results for both sets of results. Results have been ommitted to save space, but can be retrieved upon request.

Table 4.17: Impact of different types of trade agreements on firm exports.

	(1) Ln(exp)	(2) Ln(exp)	(3) Ln(exp)	(4) Ln(exp)	(5) Ln(exp)	(6) Ln(exp)
PTA	-0.23***	0.00	-0.02	0.09	0.04	-0.02
	(0.054)	(0.021)	(0.020)	(0.060)	(0.060)	(0.060)
FTACU	-0.19***	0.00	0.02**	0.08***	0.04**	0.00
	(0.018)	(0.008)	(0.010)	(0.022)	(0.019)	(0.018)
Ln(av pw)	0.44***	-0.04***	-0.01	-0.05***	0.00	
	(0.042)	(0.013)	(0.011)	(0.018)	(0.010)	
Ln(firmsize)	0.20***	0.36***	0.38***	0.36***	0.39***	
	(0.021)	(0.006)	(0.006)	(0.008)	(0.010)	
Ln(employees)	-0.26***	-0.13***	-0.05***	-0.15***	0.01	
	(0.022)	(0.015)	(0.013)	(0.020)	(0.013)	
Ln(profits)	-0.02***	0.00	-0.00	0.00	0.00	
	(0.003)	(0.001)	(0.000)	(0.001)	(0.000)	
Ln(age)	0.07**	0.01	-0.05**	-0.02	-0.04**	
	(0.030)	(0.026)	(0.021)	(0.033)	(0.021)	
Ln(GDP)	0.06***	0.18***	0.28***	0.22***	0.36***	0.33***
	(0.006)	(0.004)	(0.005)	(0.018)	(0.015)	(0.016)
Ln(dist)	0.02	-0.05***	-0.15***			
	(0.015)	(0.005)	(0.006)			
Comlang	0.08***	0.01*	0.04***			
	(0.014)	(0.007)	(0.008)			
Colony	0.07*	0.36***	0.61***			
	(0.039)	(0.042)	(0.070)			
Fixed effects	no	t, f, p	t, fp	t, fj	t, fp, fj	ft, fp, fj
Observations	2 488 543	2 480 473	2 238 765	2 410 917	2 179 764	2 150 303

With TA trade agreement, $av\ pw$ added value per worker, GDP nominal GDP, $dist$ weighted distance, $comlang$ common language (spoken by at least 20% of the population) and $colony$ colonial ties. Regressions are performed on the $fpjt$-level, with f denoting firms, p CN8 products concorded over time, j destinations and t years. Clustered standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

Table 4.18: Robustness check.

	(1) Ln(exp)	(2) Ln(exp)	(3) Ln(exp)	(4) Ln(exp)	(5) Ln(exp)	(6) Ln(exp)
TA	-0.18***	0.02**	0.04***	0.07***	0.04*	0.04**
	(0.024)	(0.012)	(0.014)	(0.026)	(0.023)	(0.022)
Ln(av pw)$_{t-1}$	0.63***	-0.02	0.01	-0.05**	0.02*	
	(0.068)	(0.018)	(0.014)	(0.024)	(0.013)	
Ln(firmsize)$_{t-1}$	0.20***	0.25***	0.23***	0.24***	0.23***	
	(0.041)	(0.013)	(0.012)	(0.017)	(0.013)	
Ln(employees)$_{t-1}$	-0.27***	-0.07***	0.01	-0.13***	0.07***	
	(0.041)	(0.024)	(0.019)	(0.033)	(0.021)	
Ln(profits)$_{t-1}$	-0.03***	-0.00	-0.00**	-0.00	-0.00	
	(0.004)	(0.001)	(0.001)	(0.001)	(0.001)	
Ln(age)$_{t-1}$	0.18***	0.12***	0.13***	0.09	0.21***	
	(0.046)	(0.045)	(0.044)	(0.057)	(0.050)	
Ln(GDP)	0.10***	0.26***	0.36***	0.35***	0.48***	0.45***
	(0.010)	(0.005)	(0.006)	(0.023)	(0.020)	(0.021)
Ln(distw)	0.03	-0.08***	-0.17***			
	(0.024)	(0.008)	(0.009)			
Comlang	0.07***	-0.01	0.00			
	(0.022)	(0.009)	(0.011)			
Colony	0.31***	0.45***	0.69***			
	(0.077)	(0.062)	(0.099)			
Fixed effects	no	t, f, p	t, fp	t, fj	t, fp, fj	ft, fp, fj
Observations	1,128,272	1,125,166	1,086,759	1,105,812	1,069,451	1,050,787

With TA trade agreement, $av\ pw$ added value per worker, GDP nominal GDP, $dist$ weighted distance, $comlang$ common language (spoken by at least 20% of the population) and $colony$ colonial ties. Regressions are performed on the $fpjt$-level, with f denoting firms, p CN8 products concorded over time, j destinations and t years. Clustered standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

Chapter 5

Market power and bilateral tariff negotiation outcomes

5.1 Introduction

Why do countries conclude trade agreements? To answer this question, economists tend to rely mainly on the terms-of-trade theory of trade agreements[1]. This theory states that governments acting unilaterally will tend to overuse tariffs and other trade restrictions to the extent that they are able to shift the cost of protecting a domestic industry onto foreign producers. This cost-shifting is made possible through movements in foreign exporter prices or terms of trade, and the extent of the cost-shifting is directly related to how much market power a country has for a given good. We define market power as the inverse elasticity of the foreign export supply of that country for a given good, with high market power being equivalent to facing a less elastic export supply curve for a particular good. This implies that an increase in the tariff of a good with no market power (i.e. a perfectly elastic export supply) will result in an equal increase of the price of that good in the importing country, as foreign exporters will just pass the price of the tariff on to the consumers. For goods with positive to infinite market power, however, foreign exporters will absorb (some of) the price increase, resulting in a change of the terms of trade of that country for this good. Countries with high market power for a good will want to set a positive optimal tariff on that good, as the distortion caused by the tariff will be compensated by an improvement of the terms of trade. While maximizing the domestic government's objective function, this unilateral policy is inefficient from an international point of view as it imposes a negative externality on the trading partners. Moreover, consumer surplus

[1] See chapter 1 section 1.4 for a discussion of alternative theories.

is decreased due to higher prices for consumed products and services. The purpose of a trade agreement is then to undo the policy inefficiencies and improve the welfare of each country.

While it is typically assumed that countries either have high market power or not, we define market power in this paper on the product-level, as market power is directly related to the export supply elasticity, which is determined on the product-level. Yet, large countries are typically considered to have higher market power across all goods as they face less elastic export supply curves *on average*, while smaller countries have lower market power across goods *on average*. Moreover, small countries find it harder to affect international prices through trade policy for the average good.

The terms-of-trade theory can easily be generalized to more realistic settings. The literature has augmented the terms-of-trade hypothesis with a range of political economy considerations. Grossman and Helpman (1995a) and Grossman and Helpman (1995b) for example, show how lobbying affects the relationship between the optimal tariff and market power. The optimal tariff is no longer only determined by the market power of a country for a particular good, but now also depends on the presence (or absence) of lobbies and their preferences. Baldwin and Robert-Nicoud (2015) show in their 2-country model how reciprocity and gradual firm entry and exit will result in a step-like reduction of tariffs as observed through the multiple liberalization rounds in the liberalization processes of the GATT and the WTO. Their juggernaut theory of trade liberalization assumes that after an initial tariff cut, firms in the import-competing sectors will exit, while there will be firm-entry in the export sectors. This reshapes the political economy landscape, as the size of the pro-tariff (anti-tariff) lobby will shrink (rise) in every participating nation. When the next round of trade talks is held, another reciprocal tariff cut is politically optimal since the pro-tariff lobby is smaller and the anti-tariff lobby is larger in every member that participated in the last reciprocal cuts.

Closely related to this literature is the literature on economic determinants of trade agreements. Rather than studying *why* countries conclude trade agreements, this literature attempts to predict *which* country pairs will form a trade agreement. In their seminal contribution, Baier and Bergstrand (2004) show that the likelihood of countries forming an FTA is higher when the partners are closer geographically, more distant from the rest of the world, larger, more similar in economic size, and further apart in terms of per capita incomes. Subsequently, Egger and Larch (2008), Chen and Joshi (2010), Baldwin and Jaimovich (2012), and Baier, Bergstrand, and Mariutto (2014) have supplemented Baier and Bergstrand (2004) by studying the "interdepence" and "contagiousness" of trade agreements.

Even though the terms-of-trade hypothesis is more than a century old,

evidence to support or reject the theoretical arguments has long been non-existing. This has changed during the last decade, and evidence supporting the validity and usefulness of the theory is mounting. Broda, Limão, and Weinstein (2008) present convincing evidence on the positive relationship between market power and tariffs in a non-cooperative setting. They do this by examining the tariff schedules of 15 non-WTO countries, and US trade restrictions not covered by the WTO. Moreover, Bagwell and Staiger (2011) consider changes in the tariff schedules of countries who have recently acceded to the WTO, while Bown (2004) and Bown and Crowley (2013) study the relation between market power and WTO disputes and antidumping duties, respectively. Exploiting the formation of an FTA between a set of countries as an exogeneous shock to the terms of trade of the rest of the world, Saggi, Stoyanov, and Yildiz (2015) show that non-member countries reduce their MFN tariffs in response to this negative terms-of-trade shock. Finally, Ludema and Mayda (2013) are the first to explore the link between market power and domestic and foreign political economy considerations. They investigate the choice of MFN tariffs by existing WTO members and control for some political economy variables. All produce findings consistent with the (augmented) terms-of-trade hypothesis, and hence support the validity of the terms-of-trade hypothesis in explaining the purpose of the multilateral trading system.

However, the (augmented) terms-of-trade hypothesis does not only explain the existence of multilateral trade agreements, it also explains the presence of bilateral trade agreements (EIAs). Though, up to date, and to the best of our knowledge, there is no convincing empirical evidence on the validity of this argument. Two studies try to test the hypotheses derived from the Grossman and Helpman (1995b) model, namely Damuri (2012) and Gawande, Sanguinetti, and Bohara (2005), while Stoyanov (2016) tests predictions of an extension of the Grossman and Helpman (1995b) model. However, none of these papers accounts appropriately for market power[2], thereby introducing severe omitted variable bias in their results.

This paper wants to fill this gap. We contribute to the literature by testing the terms-of-trade hypothesis in relation to free trade agreements for the first time. We do so in a comprehensive manner by combining different factors in the process of trade negotiations. Concretely, we want to test whether goods with higher market power are treated differently in free trade agreement negotiations compared to goods with low market power. To do so, we cannot simply use the negotiated tariff as a dependent variable, as

[2]While Damuri (2012) ignores the concept of market power completely, Gawande, Sanguinetti, and Bohara (2005) do include it in their econometric model to test the Grossman and Helpman (1995b) hypothesis. However, due to lack of estimates of the export supply elasticity at the time, they assume the inverse elasticity of foreign export supply to be equal to 1. The model of Stoyanov (2016) only considers the import demand elasticity, but not the (inverse) export supply elasticity.

the purpose of free trade agreements is to abolish tariffs between countries. Therefore, we exploit the argument developed in Grossman and Helpman (1995b) that governments exclude products from free trade agreements to create the best opportunity for exporting interests to overcome opposition to the FTA from import-competing producers. Alternatively, governments can also impose quotas or obtain (longer) phase-out periods for products so that industries have time to adjust. These measures provide excellent alternatives to using tariffs as a dependent variable, as Grossman and Helpman (1995b) show that they are related to market power.

We use a novel dataset capturing the complexity of trade agreements on the product-level. Our dataset contains detailed data on the liberalization schedule of all products in 15 recently concluded FTAs between countries in Asia, North, Central and South America, Europe and Oceania. To ensure enough variation in our data, we include small as well as large countries in our dataset, as well as developed and developing countries. To measure market power, we use the method outlined in Broda, Limão, and Weinstein (2008) for estimating the inverse export supply elasticity. We start by estimating the impact of market power on the probability of a product to be exempted from liberalization in free trade agreements on the one hand, and the speed of liberalization of a product on the other hand. We then extend our baseline model and include variables capturing lobbying efforts and reciprocity in negotiations in our estimations.

Our findings provide support for the augmented terms-of-trade hypothesis. We find that products with higher market power are exempted more often from liberalization and have a slower liberalization path. While economists often assume that most countries are "small", i.e. they do not have market power for any good, our results show that this is not the case. Even small countries have considerable market power for certain products, and manage to exclude these products from liberalization in free trade agreements.

Moreover, extending our baseline model and including variables capturing lobbying efforts and reciprocity of trade negotiations, also results in findings that are consistent with the theory. We find that products in import-competing sectors that are politically organized to lobby are excluded from liberalization more often, while we find the opposite for products from exporting sectors that are politically organized. Our results are robust to using different measures of market power and lobbying.

Finally, our findings suggest that countries that are already willing to go further when it comes to opening up trade in terms of free trade of goods, seem to also be more open to including more WTO^{+} and WTO^{X} provisions. However, our results do not support the idea that countries can include more WTO^{+} and/or WTO^{X} provisions when granting the partner country less liberal tariff conditions.

This paper is structured as follows. Section 5.2 discusses the theory on optimal tariffs and market power in more detail. Section 5.3 and section 5.4 respectively discuss the method and data used. Main results are presented in section 5.5, while section 5.6 presents two extensions to the baseline model. Section 5.7 concludes.

5.2 The optimal tariff argument

The basic theory underlying the optimal tariff argument can be traced back all the way to the early 1800s, when British economists heatedly debated the (potential) repeal of the Corn Laws and other tariffs. While classical economists had been stressing the benefits of tariff reductions and freer international trade for decades, controversy arose on the impact of a unilateral tariff reduction on British general welfare. At that time, international trade theory was sophisticated enough to recognize that tariffs could increase national income for a country that could influence its terms of trade. While the classical economists were united about the significance of improved resource allocation, they were divided about the importance of the terms of trade effect. Consequently, economists such as Robert Torrens and John Stuart Mill expressed caution about, or even outright opposition to, a purely unilateral reduction of the Corn Laws and other tariffs. Others, such as Nassau Senior and John Ramsay McCulloch, denied that tariff liberalization needed to be reciprocated and either ignored terms of trade considerations or thought they would be minor compared to the benefits from improved resource allocation (Irwin, 1988).

Today, a similar debate has emerged in the UK. The Brexit has stirred up many discussions about the impact of trade policy, with proponents of leaving the EU arguing that the UK could benefit from leaving the EU by unilaterally removing all tariffs on imports into the UK (Dhingra et al., 2016). This in order to lower the cost of imported goods. A study by Dhingra et al. (2016) simulates this scenario, and finds that if the UK unilaterally removes all tariffs, this would indeed reduce the loss of income due to Brexit by 0.3 percentage points. However, Brexit would still result in a loss of income of 1.0% to 2.3% because of reduced trade with the EU.

In this section we provide the basic intuition behind the terms-of-trade theory, and then generalize the theory to more realistic settings. We do this by augmenting the theory to allow for lobbying and the possibility to conclude trade agreements. Section 5.2 derives the optimal tariff for each country when governments maximize national income with their unilateral tariff choices. Section 5.2 generalizes this optimal tariff relationship to also include cases where the government's objective is not social welfare maximization. Finally, section 5.2 allows for the conclusion of trade agreements.

Unilateral and non-cooperative optimal tariffs

We focus on a country i that takes as given the policies of the remaining n $\geqslant$ 1 countries (Broda, Limão, and Weinstein, 2008). Suppose each individual in country i has a utility defined over a numeraire good, c_0, and a vector of non-numeraire goods $u(\mathbf{c})$:

$$U = c_0^h + \sum_p u_p(c_p^h) \tag{5.1}$$

Here we consider the simple case where $u(\mathbf{c})$ is separable. Each individual h with incomes I^h chooses expenditure on each good c_p to maximize (1), subject to $c_0^h + \sum_p p_p c_p^h \leq I^h$, where p_p is the domestic price for c_p. Given this utility, the demand for each good p is simply a function of its own price, i.e., $c_p = c_p(p_p)$. Social welfare is then the sum of the individual indirect utilities, which includes income and consumer surplus (Broda, Limão, and Weinstein, 2008):

$$W = \sum_h \left[I^h + \sum_p \Big(u_p(c_p(p_p)) - p_p c_p(p_p) \Big) \right] \tag{5.2}$$

To determine income, Broda, Limão, and Weinstein (2008) employ the standard assumption in the leading endogenous trade policy models, e.g. Grossman and Helpman (1994) and Grossman and Helpman (1995a). First, the numeraire is freely traded and produced using only labor according to a constant returns production function. So, the equilibrium wage is determined by the marginal product in this sector, which is normalized to one. Second, the non-numeraire goods are produced under constant returns to scale using labor and one factor specific to the goods.This means that each specific factor earns a quasi-rent that is increasing in the good's price, $\pi_p(p_p)$. Finally, tariff revenues for each good, $r_p(p_p)$, are redistributed uniformly to all individuals. All individuals own a unit of labor and a fraction of them also own up to one unit of specific capital. Normalizing the population to be one and recalling that the wage is also unity, social welfare can be rewritten as

$$W = 1 + \sum_p [\pi_p(p_p) + r_p(p_p) + \kappa_p(p_p)] \tag{5.3}$$

The world price for each traded good $g \in G_m$ is determined by the market clearing conditions

$$m_p((1+\tau_p)p_p^*) = m_p^*(p_p^*) \quad \forall p \in G_m, \tag{5.4}$$

where m_p represents home's import demand written as a function of the domestic price, $p_g = (1+\tau_p)p_p^*$, and m_p^* is the rest of the world's export supply. From this Broda, Limão, and Weinstein (2008) obtain prices as

functions of the trade policy, i.e., $p_p(\tau_p)$, $p_p^*(\tau_p^*)$. A government choosing the tariff to maximize (3) will set it according to the following first order conditions:

$$\tau_p p_p^* \frac{dm_p}{d\tau_p} - m_p \frac{dp_p^*}{d\tau_p} = 0 \quad \forall p \in G_m. \tag{5.5}$$

With the first term representing the domestic distortion caused by the negative impact of tariffs on import levels. The second term represents the terms-of-trade effect. If the country has no market power in trade, i.e., if the export supply elasticity is infinite, then $dp_p^*/d\tau_p = 0$, and the optimal tariff is zero. Otherwise, the optimal tariff is positive and Broda, Limão, and Weinstein (2008) show that it equals the inverse export supply elasticity:

$$\tau_p^{opt} = \omega_p \equiv \left[\left(\frac{dm_p^*}{dp_p^*} \right) \left(\frac{p_p^*}{m_p^*} \right) \right]^{-1}. \tag{5.6}$$

Unilateral optimal tariffs and lobbying

The positive relationship between tariffs and market power can be generalized to more realistic settings. The relationship holds *even* when governments are not immune for political pressures and governments accept contributions from lobby groups instead of acting as benevolent servants of the public interest. Even though the terms-of-trade argument is often associated with a welfare-maximizing government, the (partial) positive relationship between tariffs and market power holds also when the government places no weight on social welfare at all.

When we allow for lobbying of importing firms, the government's objective function now becomes $aW_p + \lambda_p \pi_p$, with the last term representing lobbying contributions from organized lobbies representing importing firms. Grossman and Helpman (1995a) show that the non-cooperative tariff the government chooses in this case is a sum of the inverse export supply ratio and the lobbying motive for tariffs

$$\tau_p^{GH} = \omega_p + \lambda_p \frac{z_p}{\sigma_p}, \tag{5.7}$$

with $\lambda_p = \frac{I_p - \alpha}{a + \alpha}$, I_p 1 if a sector is politically organized, $a \in (0, \infty)$ the weight the government places on aggregate social welfare relative to contributions from importing firms, α the fraction of the population that owns the specific input used to produce product p and z_p the inverse import penetration ratio, i.e. domestic sales of good p divided by total imports of good p. The tariff for an organized group is increasing in the inverse import penetration ratio, because a given tariff generates larger benefits for a factor owner if it applies to more units sold. The tariff depends negatively on the import demand elasticity because the tariff's distortion is increasing in σ_p once we account for the terms-of-trade effect.

If the government values only aggregate social welfare (i.e. $a = \infty$), λ_p will equal zero and the government will unilaterally choose a tariff equal to the optimal tariff (i.e. $\tau_p^{GH} = \omega_p$). If the government does not place any weight on social welfare and only cares about lobbying income (i.e. $a = 0$), then the government will set tariffs differently for products in sectors that are politically organized compared to sectors that are not. In the former, the government will set the non-cooperative tariff to $\tau_p^{GH} = \omega_p + \frac{1-\alpha}{\alpha}\frac{z_p}{\sigma_p}$. Both $\frac{1-\alpha}{\alpha}$ and $\frac{z_p}{\sigma_p}$ are positive. This implies that sectors that lobby the government are effectively able to buy protection through higher tariffs for their products, as the tariff under this scenario will be larger than the tariff governments set when they only care about maximizing social welfare. For the latter products, the non-cooperative tariff will be set to $\tau_p^{GH} = \omega_p - \frac{z_p}{\sigma_p}$. Products from sectors that are not politically organized while others are, will receive lower tariffs compared to products from sectors that are politically organized *and* compared to products from any sector when the government does not value lobbying efforts ceteris paribus. The parameter α can be interpreted as measuring the "pass-through" of the lobbying efforts, with a smaller α resulting in higher tariffs for products in sectors that are politically organized compared to a higher α.

Trade agreements and optimal tariffs

When we allow for free trade agreements, governments no longer only get to decide on the domestic tariffs, but also have some bargaining power in the trade negotiations about the tariffs of the FTA partner country. Next to importing lobbies, interests of exporting lobbies therefore now also enter the objective function of the domestic government, as well as concern for the FTA partner. The objective function of the domestic government changes as follows (Ludema and Mayda, 2013):

$$aW_p + \lambda_p \pi_p + \psi_p \pi_p^{EXP} + \phi_p \pi_p^{FTA} \tag{5.8}$$

with λ_p the political clout of importing firms (as before), ψ_p the political clout of exporting firms, π_p^{EXP} own export profits, ϕ_p the governments concern about the interests of its FTA partner, and π_p^{FTA} export profits of the FTA partner. We allow λ_p to be different from ψ_p. These weights can represent lobbying efforts as in Grossman and Helpman (1995a) and Grossman and Helpman (1995b), but they are also consistent with other political economy models such as the median-voter framework or labor union lobbying (see for example Baldwin, 1987; Helpman, 1997). The last term represents the bargaining power the FTA partner has to assure its exporters of preferential access to country i's market.

Ludema and Mayda (2013) show that in this case, the negotiated tariff equation becomes

$$\tau_p^N = \frac{\omega_p(1 - \sum \psi_p s_p) + \lambda_p \frac{z_p}{\sigma_p} - \frac{1-\phi_p}{\sigma_p} s_p}{1 - \lambda_p \frac{z_p}{\sigma_p} + \frac{1-\phi_p}{\sigma_p} s_p} \tag{5.9}$$

with s_p the import share of the partner country, i.e. imports from the partner country of good p divided by total imports of good p. As before, the negotiated tariff is increasing in $\lambda_p \frac{z_p}{\sigma_p}$ for organised sectors, which captures the political influence of import-competing firms. However, tariffs are now also decreasing in $\sum \psi_p s_p$, which measures the political influence of exporting firms. Exporting firms have two reasons to prefer low domestic tariffs. First of all, to the extent that firms import their inputs from abroad, domestic import tariffs will equal a higher cost structure for the exporting firm. Second, domestic protection will induce partner countries to also protect their industries, hence lowering market access of the domestic exporters. The influence of FTA partners, $\frac{1-\phi_p}{\sigma_p} s_p$, is ambiguous in sign. FTA partners may apply diplomatic pressure on the importing country to preserve the preferential market access of their exporters. If the concern for the FTA partner is small, i.e. $\phi_p < 1$, then the negotiated tariff is decreasing in the FTA share of imports. While if it is large, i.e. $\phi_p > 1$, it is increasing.

To summarize, we expect to see higher tariffs for products that are in import-competing sectors that are politically organized and products that have a higher export supply elasticity. We expect to see lower tariffs for products that are in exporting sectors that are politically organized.

5.3 Methodology

In order to test the terms-of-trade hypothesis for free trade agreements, we cannot simply estimate equation (5.9) and use the negotiated tariff as a dependent variable, as studies examining the terms-of-trade hypothesis in the context of the WTO do. This because the purpose of free trade agreements is to abolish tariffs between countries, and our dependent variable would hence consist of a zero matrix. We therefore shift our focus from tariffs on all products, to products getting special treatment in FTAs.

In one of their seminal works, Grossman and Helpman (1995b) developed a theoretical framework that identifies the conditions for which an FTA between two countries can be politically viable. Crucial in their analysis, is the stance of industries towards the FTA. In their model, industries that are expected to lose (gain) from the potential FTA, will try to lobby the government of their country to oppose (support) the FTA. The degree to which they are successful, depends a.o. on whether they are politically organized, their political weight, what the stance is of other lobbies and how much the government cares about lobbies. They show that, for an

FTA to be viable, the amount of industries in each country respectively that stands to gain from the agreement needs to be sufficiently "balanced", as this creates the best opportunity for exporting interests to overcome opposition to the FTA from import-competing producers. If not, industries that stand to lose a lot from the FTA will be able to successfully lobby their government's stance on the FTA.

Staging categories can be used to shift this balance. By allowing countries to exclude certain products, impose quotas or have (long) phase-out periods that give industries time to adjust, governments can capture the support of some potential losers, while at the same time winning the favor of exporters who would benefit from the agreement. This is exactly what we see in real world trade agreements. Trade agreements are not simply absent or present between a country pair. Most trade agreements do not foresee in complete free trade between the partners once the agreement comes into force. Rather, trade agreements typically consist of pages and pages of appendices[3], describing the liberalization path for each product or tariff line. This liberalization path consists of a tariff base rate (fixed or ad valorem or both) from which the liberalization will take place, and the staging category (in trade agreements with the European Union, there are typically between 10 and 25 different staging categories) determining the exact number of months and subsequent percentage tariff reduction. Not all products however get liberalized completely, and hence these appendices typically also contain clauses on quotas, entry price systems, exceptions, etc. for certain goods. Policy makers thus have a lot of options to tailor a trade agreement to their exact needs and wishes. However, economists typically neglect this complexity.

We will first look at the relationship between market power and product exclusions, on the one hand, and the length of the phase-out periods, on the other hand. We then extend our baseline model and include variables capturing lobbying efforts and the concern for the FTA partner in trade agreement negotiations.

Construction of the dependent variables

From the appendices of the trade agreements, we can easily construct a couple of variables capturing how fast and how much a product will be liberalized: (1) an indicator variable indicating if a product is excluded from complete liberalization (2) an indicator variable indicating if a product was already completely duty-free (3) an indicator variable indicating if a product is liberalized immediately (4) an indicator variable indicating if a product is phased-in (5) a continuous variable indicating the speed of

[3]The tariff elimination schedule of the EU-South Korea FTA, for example, is a whopping 1050 pages long. This does not include additional appendices on extra procedures, rules or exceptions.

preferential liberalization, measured by the number of months to achieve zero tariffs (6) a continuous variables indicating the customs duties for a product during the liberalization period. Variables (1) to (5) are constant over time, while variable (6) is time dependent.

In certain agreements, goods are not liberalized along a linear path (in equal stages) but are kept at or close to their base rate for a longer time. Here, the liberalization is kept limited in the first years after the agreement entered into force. This reflects a higher political sensitivity than a liberalization in equal stages. In order to take this into account, we build on Adriaensen and Kerremans (2013) and construct a variable to measure the liberalization path of a product.

$$Libpath = \frac{1}{t_{max}} \sum_{t=0} \frac{\tau_t}{\tau_0} \tag{5.10}$$

with t_{max} the maximum liberalization time across agreements (in months), τ_t the tariff at time t and τ_0 the base rate. *Libpath* has a range between 0 and 1. At its lower bound, products are liberalized immediately, while at the upper bound the product is excluded from liberalization. For two categories with an equally long phase-out period, we can expect a higher score on *Libpath* in case backloading is involved.

While products are typically defined on the 8-digit or even 10-digit level in the appendices of trade agreements, these classifications are only comparable up to the 6-digit level across countries, as there is international harmonization of products in trade classifications. We therefore need to aggregate the trade agreement data up to the 6-digit level. This will allow us to compare data across agreements, but also to match the trade agreement data with data on trade flows. To do so, we convert variables (1)-(4) from indicator variables to the proportion of tariff lines within an HS6-code having certain characteristics[4] (i.e. instead of an indicator variable indicating whether or not a product is excluded from liberalization, we now obtain a variable indicating the proportion of excluded tariff lines for each HS6-code). For variable (5), (6), and *libpath* we can take simple averages. For variable (5), this of course leads to numbers of months that does no longer correspond exactly to any staging category.

Estimating market power

Measuring importer market power is conceptually very straightforward as it is defined as the inverse elasticity of export supply. However, estimating importer market power has proven to be slightly more difficult. According

[4] Another option would have been to calculate for each variable the mode by HS6-code and assign that value to the HS6-code. The number of tariff lines, however, does not indicate how important a tariff line is in value of trade, hence introducing bias to the data.

to Broda, Limão and Weinstein (2008), this is the key reason why the impact of market power on tariffs has not been examined before. Most estimates of trade elasticities simply assume that countries face an infinitely elastic supply of exports and therefore estimate only import demand elasticities.

It is only since the seminal contribution of Broda, Limão and Weinstein (2008) that a methodology is available to estimate (the inverse) export supply elasticity on the product-level for a multitude of countries. Earlier attempts were made by Irwin (1988) estimating the export supply and import demand elasticity at the aggregate level for the UK, Feenstra (1994) reporting both elasticities for eight specific products for the US, Broda and Weinstein (2006) estimating import demand elasticities for a range of imports for the US but not export supply elasticities and Romalis (2007) estimating both elasticities at the aggregate level for the US.

Broda, Limão and Weinstein (2008) estimate the import demand elasticity (σ_{ip}) and inverse export supply elasticity (ω_{ip}) using a system of import and export equations. The system can be derived in a setting where any imported product is valued according to a CES utility function and supply is perfectly competitive. They derive the following optimal demand of country i for a given variety v of a product p and the residual export supply country i faces for that variety:

$$\Delta^{k_{ip}} \ln s_{ipvt} = -(\sigma_{ip} - 1)\Delta^{k_{ip}} \ln p_{ipvt} + \varepsilon_{ipvt}^{k_{ip}}, \tag{5.11}$$

$$\Delta^{k_{ip}} \ln p_{ipvt} = \frac{\omega_{ip}}{1 + \omega_{ip}} \Delta^{k_{ip}} \ln s_{ipvt} + \delta_{ipvt}^{k_{ip}} \tag{5.12}$$

with p_{ipt} the domestic price of variety v of product p imported by country i in year t, s_{ipvt} the share of variety v of product p in country i, ε_{ipvt} demand shocks and δ_{ipvt} supply shocks. Both equations are differenced with respect to time t and a benchmark variety of the same product p imported by i, denoted k_{ip}.

Assuming that both elasticities are constant over varieties and the defined time period, and that demand and supply shocks relative to the benchmark variety k_{ip} are uncorrelated, i.e. $E_t(\varepsilon_{ipvt}\delta_{ipvt}) = 0$, equations (5.11) and (5.12) yield the following solution:

$$Y_{ipv} = \theta_{ip1} X_{1,ipv} + \theta_{ip2} X_{2,ipv} + u_{ipv}, \tag{5.13}$$

where $\theta_{ip1} = \frac{\omega_{ip}}{(1+\omega_{ip})(\sigma_{ip}-1)}$, $\theta_{ip2} = \frac{\omega_{ip}(\sigma_{ip}-2)-1}{(1+\omega_{ip})(\sigma_{ip}-1)}$, $u_{ipvt} = \frac{\varepsilon_{ipvt}^{k_{ip}} \delta_{ipvt}^{k_{ip}}}{\sigma_{ip}-1}$, $Y_{ipvt} = (\Delta^{k_{ip}} \ln p_{ipvt})^2$, $X_{1,ipvt} = (\Delta^{k_{ip}} \ln s_{ipvt})^2$, and $X_{2,ipvt} = (\Delta^{k_{ip}} \ln p_{ipvt} \Delta^{k_{ip}} \ln s_{ipvt})$.

Feenstra (1994) shows that a consistent estimator of $\theta_{1,ip}$ and $\theta_{2,ip}$ can be obtained by averaging (5.13) over time:

$$\overline{Y}_{ipv} = \theta_{ip1}\overline{X}_{1,ipv} + \theta_{ip2}\overline{X}_{2,ipv} + \overline{u}_{ipv}, \tag{5.14}$$

with the bars denoting time averages. Note that the double differencing is also useful in controlling for other factors that could otherwise induce a correlation of the error terms. In order to identify σ_{ip} and ω_{ip}, three varieties or more are needed per importer-good pair. While data on prices and shares of a single variety can pin down a relationship between σ_{ip} and ω_{ip}, they are insufficient to determine the exact value of these elasticities. Given that the true σ_{ip} and ω_{ip} are assumed constant across varieties of the same good, Feenstra (1994) shows that the true underlying elasticities are exactly identified when there are three varieties per ip pair that are sufficiently different in their second moments.

Our estimation strategy is as follows. We start by estimating equation (5.14) for each importer-good pair to obtain $\hat{\theta}_{1,ip}$ and $\hat{\theta}_{2,ip}$. We then calculate $\hat{\sigma}_{ip}$ and $\hat{\omega}_{ip}$ using our estimates for $\hat{\theta}_{1,ip}$ and $\hat{\theta}_{2,ip}$ and check that the elasticities are economically feasible, i.e. $\sigma_{ip} > 1$ and $\omega_{ip} > 0$. When we obtain more than one estimate of σ_{ip} or ω_{ip} that is economically feasible, we take the average of both values.

We use unit values and import values as indications of p_{ipt} and s_{ipvt}, respectively. As the trade agreements in our sample enter into force at different times, we calculate separate measures of market power for each trade agreement using the five years of trade data prior to entry into force[5]. The definitions of a good and a variety are dictated by data availability. The more disaggregated the choice of good, the fewer varieties per good there are, and hence the more imprecise the estimates (potentially) are. The more aggregated the choice of the good, the less informative the estimated elasticities will be. Given that the rest of our dataset contains information on the HS6-level, we follow Broda, Limão and Weinstein (2008) in defining a good as a HS4 category, and a variety as a HS6 category.

Estimation strategy

Taking the first-order Taylor approximation of equation (5.9), we obtain the following tariff equation:

$$\tau_p^N = \omega_p(1 - \sum \psi_p s_p) + \lambda_p \frac{z_p}{\sigma_p} - 1 - \phi_p \frac{s_p}{\sigma_p} \tag{5.15}$$

[5]Take for example the FTAs between the EU and Mexico and the EU and Korea. The former entered into force in 2000, while the latter only entered into force 11 years later. When we estimate elasticities for the EU, we therefore use trade data from 1994 to 1999 for the EU-Mexico agreement, and 2005 to 2010 for the EU-Korea FTA. Not only is this method more precise, it also helps us avoid endogeneity issues because of reverse causality.

Replacing the optimal tariff with either the proportion of excluded tariff lines per HS6 product or the liberalization path of the product, we can write the general econometric model we will estimate as follows:

$$depvar_{ipv} = \beta_1 f(\omega_{ip}) + \mathbf{Z}_{is} + \mathbf{Z}_i + \mathbf{Z}_{iv} + \varepsilon_{ipv} \tag{5.16}$$

with $\mathbf{Z}_{is}$ a vector of variables capturing lobbying efforts, $\mathbf{Z}_i$ country characteristics, $\mathbf{Z}_{iv}$ product characteristics and ε_{ipv} the error term. Although the theory predicts a linear relationship between market power and tariffs, we follow Broda, Limão and Weinstein (2008) by estimating different functional forms, as there are theoretical and economical reasons to expect the true effect to diminish at higher levels of market power.

We start by evaluating the relationship between market power and our dependent variables. To do this in a parsimonious way, we abstract of any variables capturing lobbying efforts or concern for the FTA partner, and instead include fixed effects. This has the advantage of allowing us to use the maximum number of observations. We estimate our model using country fixed effects, country and sector fixed effects, and country-sector fixed effects, respectively. As our measure of market power, we use the coefficients we have estimated using the method outlined in the previous section. In order to account for the (potential) diminishing impact of market power, we also include the square of market power in one regression. To address the skewness of market power, we also estimate the regression using a semi-log specification, i.e. $f(\omega) = \ln(\omega)$. Finally, to account for the outliers of our elasticity estimates, we create a dummy variable equal to 1 if the inverse export elasticity estimate is in the top two thirds of all products' estimates within the same country and use that in our estimation.

In a second stage, we include variables capturing lobbying efforts. As political pressure is unfortunately unobserved for our sample of countries, we have to be creative with the use of proxy variables. First, we follow Ludema and Mayda (2013) and attempt to capture domestic political pressure by using a sector dummy for λ_{ip} and ψ_{ip}. We interact the former with $\frac{z_{ip}}{\sigma_{ip}}$ and the latter with s_p. We measure the inverse import penetration ratio as value-added minus exports divided by total imports. Secondly, we use tariffs as a proxy for λ_{ip} and ψ_{ip}, as did Damuri (2012). High MFN tariffs for a product could indicate that firms were successful in lobbying the government for protection. We can therefore assume that industries that were successful at obtaining protection for a good, will want to maintain protection on this good. Finally, Gilligan (1997) shows that the demand for protection from an industry is strongly correlated with the degree of intra-industry trade and the employment in that sector. We therefore use both these measures as a proxy variable for lobbying efforts. To calculate the degree of intra-industry trade, we use the Grubel-Lloyd index, as is standard in the literature. The index is increasing in the degree of intra-

industry trade, with $IIT_{ip} = 0$ inter-industry trade only and $IIT_{ip} = 1$ intra-industry trade only, and can be expressed as

$$IIT_{ip} = 1 - \frac{\mid exp_{ip} - imp_{ip} \mid}{exp_{ip} + imp_{ip}}$$

with exp_{ip} (imp_{ip}) exports (imports) of good p from country i. We use the same level of aggregation for product p as when calculating the inverse export supply elasticity, as the Grubel-Lloyd index is fairly insensitive to the level of aggregation according to Grubel and Lloyd (1975). We include the interaction of the FTA share of imports with the inverse import demand elasticity as a measure of the last term of equation 5.15 in all four specifications.

In a last stage, we include variables to control for concern for the FTA partner. While Ludema and Mayda (2013) do not operationalize the concern for the FTA partner, one way to measure ϕ_p is to look at reciprocity in trade agreement negotiations. There is anecdotal evidence that countries make trade concessions and liberalize trade for one good or in one area in exchange for similar or equivalent concessions of the partner country. Van den Hoven (2013) notes for example that EU negotiations with Peru and other countries in Central and South America have been based on reciprocity of trade concessions and conditions for goods and services, while Siles-Brügge (2014) notes that the EU opened up its automobile sector for Korean exporters in the context of the EU-Korea FTA in exchange for substantial gains in areas in which EU firms were competitive. Reciprocity of trade concessions does not necessarily imply that the concessions have to be made in similar domains, however. Meunier and Nicolaïdis (2006) show how the EU uses valuable access to its large market as a "bargaining chip to obtain changes in the domestic arena of its trading partners, from labour standards to development policies, and in the international arena, from global governance to foreign policy", making it a "normative trade power" (Kerremans and Orbie, 2009; Orbie, 2011). The US uses a similar strategy (see for example Greenhill, Mosley, and Prakash, 2009; Hafner-Burton, 2005; Hafner-Burton, 2013).

We distinguish two types of reciprocity: broad and narrow. We define narrow reciprocity as all partners of a trade agreement obtaining similar trade concessions on the same goods (i.e. if one country excludes a product from liberalization, the partner country will also get a similar concession for that product). Broad reciprocity involves the exchange of concessions for one good for concessions on another good or more general concessions, such as labor and environmental provisions. To measure the impact of broad reciprocity, we include the number of WTO^{+} and WTO^{X} provisions in the trade agreement as a variable in the estimations. This classification by Horn, Mavroidis, and Sapir (2010) divides the subjects covered by trade

agreements into two categories, with the former referring to FTA provisions which fall under the current mandate of the WTO, where the parties to the FTA undertake bilateral commitments going beyond those already accepted at the multilateral level. The latter comprises the provisions of trade agreements that deal with issues lying outside of the scope of the current WTO mandate, such as commitments on labour standards, environmental issues or human rights. To measure narrow reciprocity, we include for each product the trade regime of that product for the partner country. So in our first set of regressions, we include the percentage of excluded tariff lines per product for the partner country, while in our second set we include the liberalization path of the partner country for a given product, and in the third set the phase-out period of the partner country's good.

5.4 Data

This paper uses a novel dataset on trade negotiation outcomes. Our database contains very detailed information on 15 recent trade agreements (see table 5.1 for a list of all trade agreements included). Our sample includes free trade agreements between countries in Asia, North, Central and South America, Europe and Oceania. We did not include any FTA with an African country in our sample, as data availability for estimating market power is poor. To ensure enough variation across agreements, we included FTAs with large countries (such as the US, EU and China) as well as smaller countries (Panama and Peru), and developed as well as less-developed countries. We included FTAs between two small countries as well as FTAs between a large and a small country. We also included FTAs between developed-developing country pairs, as well as developed-developed and developing-developing country pairs.

We constructed our database at the HS6-level. This is the most detailed level for which we can compare both sides of each agreement, as the tariff lines for a more detailed level are constructed using each country's own custom codes (such as the 8-digit Common Nomenclature (CN) for the EU or the 10-digit Harmonised Tariff Schedule of Korea (HSK)). Moreover, on this level, it is possible to match all trade agreement data with matching international trade statistics.

Data on the negotiated tariff liberalization schedules come straight from the trade agreements themselves[6], and have been coded by Adriaensen

[6]Note that the trade between some of the countries in our sample is subject to the Generalised Scheme of Preferences (GSP). This special clause in the WTO rules allows member countries to deviate from the Most Favoured Nation principle by lowering tariffs for least developed countries without also lowering tariffs for rich countries (see also chapter 2). These preferences are, however, not reflected in the appendices of the trade agreements. This partly because GSP preferences are unilateral preferences that are revised regularly and can be revoked at any time (e.g. the EU and US withdrew

and Kerremans (2013). Their paper describes the coding process and their dataset in more detail. While in principal the coding of these agreements is rather straightforward, in practice it is not. Some tariff lines have special clauses or missing values, while for other products there is positive trade between the two countries, but there is no corresponding tariff line.

We encountered 6 coding possibilities: (1) both base rate and staging category are given (2) both base rate and staging category are given, however the staging category includes a clause that prohibits the complete liberalization of the product such as entry price systems, tariff quota, etc. (3) the base rate is zero at the start of the agreement and hence no staging category is necessary (4) it is explicitly stated that the product is excluded from liberalization (5) either the base rate or staging category is missing or (6) the tariff line is not included in the appendix.

In this paper, we classify all products in category (2) as excluded (this in contrast to Damuri (2012) for example, who decided to only code tariff lines as excluded from liberalization if the quota for the good in question is less than 50% of its bilateral imports). Moreover, the coding of categories (1) and (3) is very straightforward. However, the coding of categories (5) and (6) is difficult as the meaning of and the motivation for the missing data is not clear.

We complement this dataset with a number of additional datasets. Data on trade flows comes from COMTRADE. This data includes yearly detailed HS6-level trade flows for the period 1995-2014. Data on value added and the number of employees comes from the Trade Production

preferences for Myanmar/Burma temporarily because of labour abuses), while this is not the case for FTA preferences.

Table 5.1: Free trade agreements included in dataset.

Agreement	**Signature**	**Entry into force**
EU-Mexico FTA	8 December 1997	1 July 2000
EU-Chile FTA	18 November 2002	1 February 2003
EU-Korea FTA	15 October 2009	1 July 2011
EU-Peru FTA	26 June 2012	1 March 2013
US-Korea FTA	30 June 2007	15 March 2012
US-Chile FTA	6 June 2003	1 January 2004
US-Peru FTA	12 April 2006	1 February 2009
US-Australia FTA	18 May 2004	1 January 2005
US-Colombia FTA	22 November 2006	15 May 2012
Panama-Chile FTA	27 June 2006	7 March 2008
Panama-Peru FTA	25 May 2011	1 May 2012
Australia-Chile FTA	30 July 2008	6 March 2009
Mexico-Peru FTA	6 April 2011	1 February 2012
Canada-Peru FTA	29 May 2008	1 August 2009
Peru-China FTA	28 April 2009	1 March 2010

Table 5.2: Proportion of tariff lines by staging category.

(a) Non-agricultural products

Agreement	**Reporter**				**Partner**			
	A	I	P	E	A	I	P	E
Australia-Chile	41.8%	47.5%	10.6%	0.0%	0.7%	96.0%	3.3%	0.0%
Chile-Panama	99.7%	0.0%	0.0%	0.3%	32.7%	32.4%	34.9%	0.0%
EU-Chile	71.3%	17.1%	11.5%	0.0%	0.5%	93.1%	5.8%	0.6%
EU-Korea	27.9%	69.5%	2.6%	0.0%	17.9%	72.1%	9.6%	0.4%
EU-Mexico	56.7%	11.4%	31.7%	0.3%	14.9%	27.7%	56.6%	0.8%
EU-Peru	27.8%	71.8%	0.1%	0.3%	56.3%	24.5%	19.2%	0.1%
Peru-Canada	49.3%	30.3%	20.3%	0.1%	57.6%	42.1%	0.3%	0.0%
Peru-China	55.9%	4.8%	29.8%	9.5%	8.7%	58.7%	27.6%	5.1%
Peru-Mexico	1.7%	84.5%	13.5%	0.3%	18.6%	68.7%	12.1%	0.5%
Peru-Panama	56.2%	22.0%	21.6%	0.2%	33.2%	24.7%	41.7%	0.4%
US-Australia	7.6%	70.7%	21.5%	0.2%	0.0%	72.8%	27.2%	0.0%
US-Chile	1.0%	95.2%	3.8%	0.0%	0.3%	93.1%	6.7%	0.0%
US-Colombia	0.8%	98.8%	0.3%	0.0%	0.2%	75.4%	24.4%	0.0%
US-Korea	2.8%	76.6%	20.6%	0.0%	0.0%	87.9%	12.1%	0.0%
US-Peru	0.8%	98.8%	0.4%	0.0%	0.0%	81.4%	18.5%	0.0%

(b) Agricultural products

Agreement	**Reporter**				**Partner**			
	A	I	P	E	A	I	P	E
Australia-Chile	74.9%	24.9%	0.3%	0.0%	0.0%	95.2%	4.4%	0.4%
Chile-Panama	99.3%	0.0%	0.0%	0.7%	14.4%	47.1%	21.2%	17.3%
EU-Chile	22.2%	7.1%	45.7%	24.9%	0.0%	86.0%	11.4%	2.6%
EU-Korea	13.9%	68.9%	14.8%	2.4%	2.7%	28.2%	65.0%	4.0%
EU-Mexico	12.6%	7.4%	42.2%	37.8%	9.7%	35.2%	25.5%	29.6%
EU-Peru	15.4%	63.9%	3.0%	17.7%	16.2%	36.7%	34.1%	13.0%
Peru-Canada	12.7%	43.9%	33.5%	9.9%	42.4%	49.2%	0.5%	7.9%
Peru-China	16.6%	56.3%	27.1%	0.0%	8.0%	20.2%	64.2%	7.6%
Peru-Mexico	5.5%	29.1%	43.2%	22.2%	10.5%	24.3%	44.8%	20.4%
Peru-Panama	38.8%	28.7%	19.8%	12.8%	17.7%	35.0%	28.9%	18.4%
US-Australia	1.0%	48.0%	24.4%	26.6%	0.0%	100.0%	0.0%	0.0%
US-Chile	2.1%	79.1%	18.8%	0.0%	0.0%	73.4%	26.6%	0.0%
US-Colombia	0.0%	94.7%	5.3%	0.0%	4.4%	74.5%	21.1%	0.0%
US-Korea	1.5%	44.3%	54.2%	0.0%	0.0%	28.1%	71.0%	1.0%
US-Peru	0.8%	90.9%	4.1%	4.2%	0.0%	50.5%	49.5%	0.0%

With A already duty-free, I immediate, P phased-in and E exception.

and Protection Database, compiled by Nicita and Olarreaga (2007). This dataset contains data by sector for 100 countries and 28 manufacturing sectors. The sectors correspond to the 3-digit level International Standard Industrial Classification (ISIC). We use correspondance tables to link this data to our trade flow and trade agreement data. Data on MFN tariffs before the trade agreement comes from UNCTAD's TRAINS database. Finally, data on WTO^X and WTO^+ provisions comes from Kohl, Brakman, and Garretsen (2016), who build on and extend Horn, Mavroidis, and Sapir (2010).

5.5 Main results

Results using the percentage of excluded tariff lines per product as a dependent variable are presented in table 5.3, while results using the liberalization path of products are presented in table 5.4. The first set of regressions (columns (1)-(6)) is estimated using ordinary least squared, while the remainder of the regressions are estimated using a probit regression. The first two sets include all products, while the last set of regressions only uses non-agricultural products. Estimations including country fixed effects, country and sector fixed effects or country-sector fixed effects yield very similar results.

We start by estimating a linear relationship between market power and product exclusions, and then allow for different functional forms of ω. We find a negative correlation between market power and product exclusions, this when using a probit estimator as well as OLS. This finding suggests that products with higher market power have a lower probability of being excluded from liberalization. This at odds with the theory, as we expect a positive relationship between both. Including the square of market power in the estimation does not change the sign of the coefficient when including all products in the estimation. However, the coefficient for ω turns positive (though not statistically significant) when excluding agricultural products.

The negative coefficients are probably due to outliers in the elasticity estimates. When we use a dummy for products with high market power, the results are positive and statistically significant across all three sets of estimations: products with high market power have a higher chance of being excluded from trade liberalization compared to products with low market power. Excluding outliers[7], we confirm these findings: now the coefficient for ω is positive (though not statistically significant across all specifications). Including ω^2 in the estimation, we find that the coefficient for the square term is negative, i.e. the impact of market power on the

[7]We define outliers as values that are higher than the 90th percentile for each country.

Table 5.3: Market power and product exclusions in free trade agreements.

	(1)	(2)	(3)	(4)	(5)	(6)
			Set 1: Probit - All products			
ω	-0.0138**			-0.0138**		
	(0.006)			(0.006)		
High ω		0.1661***				
		(0.048)				
Ln(ω)			-0.0120			
			(0.015)			
ω^2				0.0000**		
				(0.000)		
ω'					0.1903**	
					(0.076)	
ω'^2					-0.0586***	
					(0.021)	
Ln(ω')						0.0406*
						(0.022)
			Set 2: Probit - Non-agricultural products only			
ω	-0.0067			0.0150		
	(0.006)			(0.017)		
High ω		0.3263***				
		(0.084)				
Ln(ω)			0.0181			
			(0.022)			
ω^2				-0.0005*		
				(0.000)		
ω'					0.3626***	
					(0.120)	
ω'^2					-0.1235***	
					(0.033)	
Ln(ω')						0.0339
						(0.030)
			Set 3: OLS - All products			
ω	-0.0000**			-0.0000***		
	(0.000)			(0.000)		
High ω		0.0048**				
		(0.002)				
Ln(ω)			-0.0013**			
			(0.001)			
ω^2				0.0000***		
				(0.000)		
ω'					0.0031	
					(0.004)	
ω'^2					-0.0013	
					(0.001)	
Ln(ω')						0.0006
						(0.001)
Observations set 1	16,669	16,669	16,669	16,669	14,996	14,996
Observations set 2	8,805	8,805	8,805	8,805	7,796	7,796
Observations set 3	20,039	20,039	20,039	20,039	18,014	18,014

Robust standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.10. Dependent variable: percentage of excluded tariff lines by HS6-product. Only tariff lines that were not already duty-free are considered. ' denotes variables without outliers (top 10 percentile by country). All estimations include country and sector fixed effects. Estimations with country fixed effects only, or country-sector fixed effects yield very similar results. Results can be retrieved upon request. Sectors are defined as chapters of the Harmonised System.

Table 5.4: Market power and the liberalization path of products in free trade agreements.

	(1)	(2)	(3)	(4)	(5)	(6)
			Set 1: Probit - All products			
ω	-0.0005			-0.0006		
	(0.000)			(0.000)		
High ω		0.0430**				
		(0.021)				
Ln(ω)			-0.0197***			
			(0.007)			
ω^2				0.0000		
				(0.000)		
ω'					0.0002	
					(0.033)	
ω'^2					0.002	
					(0.009)	
Ln(ω')						0.0092
						(0.010)
			Set 2: Probit - Non-agricultural products only			
ω	-0.0003			-0.0004		
	(0.000)			(0.000)		
High ω		0.0511**				
		(0.023)				
Ln(ω)			-0.0135*			
			(0.008)			
ω^2				0.0000		
				(0.000)		
ω'					0.0012	
					(0.037)	
ω'^2					0.0042	
					(0.010)	
Ln(ω')						0.0117
						(0.011)
			Set 3: OLS - All products			
ω	-0.0000***			-0.0000***		
	(0.000)			(0.000)		
High ω		0.0056**				
		(0.002)				
Ln(ω)			-0.0021***			
			(0.001)			
ω^2				0.0000***		
				(0.000)		
ω'					0.0018	
					(0.003)	
ω'^2					-0.0006	
					(0.001)	
Ln(ω')						0.0009
						(0.001)
Observations set 2	24,214	24,214	24,214	24,214	21,643	21,643
Observations set 3	20,191	20,191	20,191	20,191	17,872	17,872
Observations set 1	24,214	24,214	24,214	24,214	21,643	21,643

Robust standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.10. Dependent variable: liberalization path of products (see text for definition). Only tariff lines that were not already duty-free are considered. All estimations include country and sector fixed effects. Estimations with country fixed effects only, or country-sector fixed effects yield very similar results. Results can be retrieved upon request. Sectors are defined as HS chapters.

probability of a product of being exempted from liberalization is indeed diminishing in market power.

To interpret the magnitude of the results, we calculate marginal effects. For column (2) of the first set, the marginal effect amounts to 0.011, meaning that products with high market power are 1.1 percentage points more likely to be excluded from liberalization than products with low market power. For agricultural products only, this effect increases to 1.5 percentage points. When estimating the relationship between product exclusions and market power using ω' and ω'^2 (column (5)), the marginal effects amount to 0.006, implying that an increase of the market power of a product with one standard deviation is associated with an increase in the share of excluded tariff lines per product of $100 * 0.859 * 0.006 = 0.5$ percentage points.

We find a similar story for the liberalization path of a product, even though the link with market power is slightly weaker and many coefficients are not statistically significant. Yet, the coefficient for the dummy indicating high market power is positive and statistically significant in all three sets of regressions, while the coefficients for ω without outliers has the right sign in all three sets of regressions. Products for which a country has a higher market power tend to be liberalized slower, this either by allowing for longer phase-out periods of the product, or by backloading the tariff reductions.

Robustness check

Our estimates for market power contain a lot of missing values. Our baseline results are therefore estimated using only part of our trade agreement data. Even though we do not have any reason to believe that the missing values will induce a systematic bias in our results, we do perform some robustness checks including our full sample. Broda, Limão and Weinstein (2008) show that log GDP, the Rauch product differentiation index[8] and the importing country's share of world imports by product are determinants of the inverse export supply elasticity. We use these measures as proxy variables for market power in our specifications.

Results are presented in table 5.5. The first set of estimations (columns (1)-(3)) uses product exclusions as a dependent variable, while the second set uses liberalization path. Both sets are estimated using a probit estimator. Overall, we find weak evidence that there is no systematic bias produced by missing values of our elasticity estimates and weak support for the terms-of-trade hypothesis. We find a positive relationship between product exclusions and GDP and import share, respectively. However, the

[8]Data on GDP is coming from World Development Indicators, while data on the Rauch classification of goods comes from Rauch (1999). We use the conservative Rauch classification, and construct a dummy taking value 1 if a good is differentiated.

Table 5.5: Robustness check.

	(1)	(2)	(3)	(4)	(5)	(6)
	Exclusions			Liberalization path		
Ln(GDP_i)	0.0236***			0.0348		
	(0.008)			(0.003)		
Differentiated		-0.1542***			0.1728***	
		(0.030)			(0.012)	
Import share			0.2421***			0.0308
			(0.078)			(0.049)
Observations	82,426	73,651	76,660	100,204	102,225	100,204

Robust standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.10. The dependent variables are either the percentage of excluded tariff lines by HS6-product or the liberalization path of a product. All estimations use a probit estimator and include country and sector fixed effects. Sectors are defined as chapters of the Harmonised System.

coefficient for differentiated goods is negative and statistically significant. For liberalization path, we find positive coefficients for all three dependent variables, but only the coefficient for differentiated goods is statistically significant, while the coefficients for GDP and import share are not.

5.6 Extensions

Lobbying efforts

Results are presented in table 5.6. The first set of estimations uses the percentage of excluded tariff lines per product as a dependent variable, while the second set uses the liberalization path of a product. Both sets of regressions are estimated using a probit estimator and all estimations include country and sector fixed effects. Note that the number of observations in our regressions drops dramatically because of missing observations. While results should be interpreted cautiously, we have no reason to assume that the missing values introduce bias into our results, as we cannot discern any pattern in the missing data.

We find that the positive relationship between market power and product exclusions is robust to including variables capturing lobbying efforts. All specifications have positive signs for the market power coefficient, and negative signs for the squared market power term. The probability of excluding a product from liberalization in a trade agreement is higher the more market power a country has for a given good, but the relationship is not linear, rather it is diminishing in market power. While not all coefficients reach statistical significance in all regressions, the coefficients are rather stable across all regressions, with magnitudes ranging from 0.60 to 0.96. Marginal effects range from 0.0178 to 0.0351, implying that an increase of the market power of a product with one standard deviation is associated with an increase in the share of excluded tariff lines per product

of $100 * 0.859 * 0.0178 = 1.53$ to $100 * 0.859 * 0.0351 = 3.02$ percentage points.

We find a similar positive relationship between market power and the liberalization path of a product: products that have higher market power have a longer phase-out period or are backloaded more often. Yet the relationship is not diminishing in market power, as the coefficient for ω'^{2} is positive in all regressions. As before, the relationship between market power and the liberalization path of a product is less pronounced than the relationship between market power and product exclusions: none of the coefficients for ω' reaches statistical significance.

Looking at the different measures for lobbying efforts, we find no effect of lobbying on product exclusions when using intra-industry trade and employment as measures of lobbying for importing and exporting sectors. We do find positive and statistically significant effects when using tariffs as a measure of lobbying efforts. Products that had higher MFN tariffs before the FTA are also more likely to be excluded from liberalization in the FTA *ceteris paribus* for import-competing sectors ($\tau * z/\sigma$). Products that already enjoyed more protection before the trade agreement hence keep enjoying a heightened probability of being protected from liberalization under the free trade agreement. Recalling that $\psi_p * s_p$ entered equation (5.15) negatively, we find that products that had higher MFN tariffs before the FTA are less likely to be excluded from liberalization in the FTA *ceteris paribus* for exporting sectors ($\tau * IS$). This suggests that both export and import-competing lobbies manage to influence trade policy. Yet, while the coefficients are statistically significant, they are small in economic terms. The marginal effect for $\tau * z/\sigma$ equals 3.34e-10, while the marginal effect for $\tau * IS$ amounts to 0.068.

Lobbies can not only (potentially) influence the probability of a product to be excluded from liberalization, they can also (potentially) influence the liberalization path of a product. For the second set of regressions, we find a statistically significant coefficient for $\tau * IS$, but not for $\tau * z/\sigma$. We also find statistically significant coefficients for $Empl * z/\sigma$, $GL * IS$ and $GL * z/\sigma$, but the coefficients have the wrong sign as the theory predicts positive signs.

Reciprocity in negotiations

Finally, we estimate the effect of the concern for the FTA partner on negotiation outcomes. Results are presented in 5.7. Columns (1) and (2) present evidence on broad reciprocity, while columns (3) and (4) present some indications on narrow reciprocity.

We find a negative and statistically significant relationship between the number of WTO$^+$ and/or WTO^X provisions and our two dependent

Table 5.6: Free trade agreements, market power and lobbying efforts.

	(1)	(2)	(3)	(4)	(5)	(6)
			Set 1: Exlusions - probit			
ω'	0.8860***	0.9653***	0.7228***	0.8314***	0.6618***	0.5961***
	(0.147)	(0.180)	(0.174)	(0.186)	(0.121)	(0.111)
ω'^{2}	-0.2930***	-0.2996***	-0.2267***	-0.2514***	-0.2307***	-0.2173***
	(0.058)	(0.068)	(0.064)	(0.067)	(0.046)	(0.044)
IS/σ	1.5780	463.8145***	2.7128	-307.5407***	3.9442**	12.3564
	(1.203)	(139.566)	(9.298)	(81.400)	(1.668)	(8.752)
$\tau * z/\sigma$			0.0000***	0.0000***		
			(0.000)	(0.000)		
$\tau * IS$				1.9319***		
				(0.462)		
$GL * IS$					-6.0364	
					(3.920)	
$GL * z/\sigma$					-0.0000	
					(0.000)	
$Empl * IS$						-0.1400
						(0.102)
$Empl * z/\sigma$						-0.0000
						(0.000)
			Set 2: Liberalization path - probit			
ω'	0.0177	0.0273	0.0556	0.0362	0.0210	0.0169
	(0.055)	(0.056)	(0.069)	(0.069)	(0.054)	(0.054)
ω'^{2}	0.0055	0.0031	0.0355**	0.0314*	0.0040	0.0049
	(0.015)	(0.015)	(0.018)	(0.018)	(0.015)	(0.015)
IS/σ	-10.7107**	-6.6968	2.2744	-50.6003**	-14.1264	-1.0803
	(4.889)	(16.302)	(5.213)	(19.762)	(11.643)	(1.839)
$\tau * z/\sigma$			-0.0000	-0.0000		
			(0.000)	(0.000)		
$\tau * IS$				0.6694**		
				(0.300)		
$Empl * IS$					0.0713	
					(0.117)	
$Empl * z/\sigma$					-0.0000***	
					(0.000)	
$GL * IS$						-1.4116*
						(0.821)
$GL * z/\sigma$						-0.0000***
						(0.000)
FE_i	yes	yes	yes	yes	yes	yes
FE_s	no	no	no	no	no	no
$FE_s * z/\sigma$	yes	yes	no	no	no	no
$FE_s * IS$	no	yes	no	no	no	no
Obs. set 1	6,898	4,047	4,914	4,914	6,901	7,232
Obs. set 2	8,804	8,804	5,933	5,933	8,804	8,804

Robust standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.10. Only tariff lines that were not already duty-free are considered. Sectors are defined as chapters of the Harmonised System. Constant is ommitted to save space.

variables. Hence, the more WTO^{+} and/or WTO^{X} provisions are included in a free trade agreement, the lower the probability a product is excluded from liberalization and the shorter its liberalization path. This refutes the idea that countries can include more WTO^{+} and/or WTO^{X} provisions when granting the partner country less liberal tariff conditions. Rather, countries that are already willing to go further when it comes to opening up trade in terms of free trade of goods, also seem to be more open to including more WTO^{+} and WTO^{X} provisions. This in contrast to narrow reciprocity. The coefficient for *Partner* is positive and statistically significant for both sets of estimations. Products that are excluded from liberalization for one country therefore have a higher probability of also being excluded for the partner country. Products that have a longer phase-out period in one country also tend to have a longer phase-out period in the partner country.

Table 5.7: Reciprocity in trade agreement negotiations.

	(1)	(2)	(3)	(4)
	Exlusions - probit			
ω'	1.2290***	1.2290***	1.6634***	1.6634***
	(0.367)	(0.367)	(0.422)	(0.422)
ω'^{2}	-0.2904***	-0.2904***	-0.3924***	-0.3924***
	(0.102)	(0.102)	(0.113)	(0.113)
IS/σ	72.0487	72.0487	-102.8417	-102.8417
	(131.069)	(131.069)	(194.139)	(194.139)
WTO^{X}	-0.1914***		-0.0782*	
	(0.040)		(0.043)	
$\text{WTO}^{+,X}$		-0.3191***		-1.304*
		(0.067)		(0.072)
Partner			1.6091***	1.6091
			(0.314)	(0.314)
	Liberalization path - probit			
ω'	-0.2575***	-0.2575***	-0.2360***	-0.2363***
	(0.081)	(0.081)	(0.082)	(0.082)
ω'^{2}	0.0840***	0.0840***	0.0695***	0.097***
	(0.023)	(0.023)	(0.023)	(0.023)
IS/σ	35.6052	33.5957	32.6644	31.3199
	(35.683)	(35.429)	(38.535)	(38.361)
WTO^{X}	-0.0834***		-0.0565***	
	(0.011)		(0.012)	
$\text{WTO}^{+,X}$		-0.1511***		-0.1024***
		(0.019)		(0.020)
Partner			1.3591***	1.3495***
			(0.183)	(0.184)
FE_i	yes	yes	yes	yes
FE_s	yes	yes	yes	yes
$\text{FE}_s * z/\sigma$	yes	yes	yes	yes
$\text{FE}_s * IS$	yes	yes	yes	yes
Obs. set 1	1,659	1,659	1,256	1,256
Obs. set 2	5,399	5,399	5,019	5,019

With $\text{WTO}^{+,X}$ denoting the sum of WTO^{+} and WTO^{X} provisions. Robust standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.10. Only tariff lines that were not already duty-free are considered. Sectors are defined as chapters of the Harmonised System. Constant is ommitted to save space.

5.7 Conclusion

Even though the terms-of-trade hypothesis is more than a century old, evidence to support or reject the theoretical arguments has long been non-existing. This paper is the first paper to test the augmented terms-of-trade hypothesis in relation to bilateral trade agreements.

Our analysis proceeds in three stages. We start by evaluating the main prediction of the simple terms-of-trade theory, and then augment it with variables capturing lobbying efforts and reciprocity in trade agreement negotiations. We find support for the augmented terms-of-trade theory in explaining bilateral tariff negotiation outcomes. Using detailed data on 15 recently concluded FTAs, we find a positive relationship between market power and the probability of a product to be exempted from liberalization. Products with higher market power also tend to have longer phase-out periods, i. e. they are liberalized slower over time. Moreover, including variables capturing lobbying efforts and reciprocity of trade negotiations, also results in findings that are consistent with the theory. Our results are robust to using different measures of market power and lobbying.

While economists often assume that most countries are "small", i.e. they do not have market power for any good, our results show that this is not the case. Even small countries have considerable market power for certain products, and manage to exclude these products from liberalization in free trade agreements.

Moreover, our findings suggest that countries that are already willing to go further when it comes to opening up trade in terms of free trade of goods, also seem to be more open to including more WTO^{+} and WTO^{X} provisions. However, our results do not support the idea that countries can include more WTO^{+} and/or WTO^{X} provisions when granting the partner country less liberal tariff conditions.

Our findings have implications for how trade negotiations are conducted. While for most countries (or trade blocs) that plan to negotiate a trade agreement (including the EU, US and Australia), conducting an impact assessment of economic effects of the potential future trade agreement on the country is a standard task in preparing for the negotiations, predicting economically which products will be easy to liberalize and which not, is not part of this preparation process. Yet, our results show that the market power of a product and the presence or absence of import-competing or exporting lobbies are good predictors of the liberalization path of a product.

This paper suffers from one major drawback, however, namely the lack of data availability on lobbying efforts for the countries in our sample. While we try to operationalize lobbying efforts as best as we can and we use multiple measures to ensure the robustness of our results, direct data on lobbying expenditures by sector is not available for the countries in our

sample. While the literature has been refining measures of lobbying contributions with respect to trade policy outcomes (see for example Bombardini, 2008; Bombardini and Trebbi, 2012; Kim, 2017), these advances so far mainly only benefit studies involving the US because of data requirements.

Chapter 6

Conclusion

> *"This is a fraught time for global trade. In many countries, trade is under siege, raising the spectre of protectionism. Alongside the anti-trade rhetoric, there is the notion that we have reached 'peak trade' or that globalisation has ground to a halt."*
>
> – Roberto Azevedo,
> Director-General WTO
> London, June 7, 2016

For a long time, business went well for the small brewery Timmermans in the small kingdom of Belgium. The brewery was exporting a lot of its beers and customers were happy. But then, one day, a terrible thing happened. The citizens of a faraway land elected a new president. The new president was evil, and he did not like things that were not made in the faraway land he was leading. This scared the good people of the brewery. What if they would no longer be allowed to export beers to the faraway country? What would happen to all their customers in the faraway country that liked their beer? The uncertainty and bleak prospects were gnawing at the beer brewers. It were dark and gloomy times.

Today, globalization, trade agreements and international trade are blamed for a wide range of evils, such as job loss, decreasing incomes, higher rates of single motherhood and child poverty, higher crime rates, higher mortality, etc. (Feler and Senses, 2016; Pierce and Schott, 2016; Autor, Dorn, and Hanson, 2016). Or as Donald Trump "eloquently" phrased it in a campaign speech at Monessen (Pennsylvania) on June 28, 2016[1]:

[1]The full speech can be found at `http://time.com/4386335/donald-trump-trade-speech-transcript/`.

> *"America has lost nearly 1/3 of its manufacturing jobs since 1997. Even as the country has increased its population, think of this, by 50 million people. At the center of this catastrophe are two trade deals (...). First, the North American Free Trade Agreement, or the disaster called NAFTA. Second, China's entry into the World Trade Organization. NAFTA was the worst trade deal in the history (...). And China's entrance into the World Trade Organization has enabled the greatest job theft in the history of our country. (...) The Trans-Pacific Partnership is the greatest danger yet. The TPP, as it is known, would be the death blow for American manufacturing. It would give up all of our economic leverage to an international commission that would put the interests of foreign countries above our own. It would further open our markets to aggressive currency cheaters – cheaters, that's what they are, cheaters."*

Free trade has been under threat since the Great Recession and the Great Trade Collapse[2], with protectionist measures rising steadily since 2008, and a sharp increase since 2012. Global Trade Alert (Evenett and Fritz, 2016) notes that the number of discriminatory measures imposed in 2015 is 50% higher than in 2014, and almost double the number of discriminatory measures imposed in 2009. Liberalising measures have also continued to increase after the crisis, but they are outnumbered by discriminatory measures by almost three-to-one. Moreover, policy uncertainty has increased greatly in the aftermath of the Brexit, the election of Donald Trump in the US and Marine Le Pen's campaign promise to withdraw from the European Union to reinstate the French Franc as part of her plan to boost French competitiveness, amongst others.

All these elements not only hamper trade today, contributing to the global trade slowdown or even trade plateau[3], but also threaten the future of free trade.

Main findings

In this context of turmoil, we formulated two main research questions. Firstly, in a time of post-truths and alternative facts, it is important to have reliable estimates of the effects of economic phenomena. We therefore

[2] Globally, industrial production fell 12%, and trade volumes fell 20% in the twelve months following April 2008 - shocks of a magnitude not witnessed since the Great Depression and the explosion of beggar-thy-neighbour protectionist measures of the 1930s (Eichengreen and O'Rourke, 2010).

[3] Evenett and Fritz (2016) argue that the global trade slowdown should be called the global trade plateau, as since the beginning of 2015, world export volumes have not grown at all instead of growing at a slower tempo than before. Such a no-growth phase of 15 months is very unusual.

researched in depth what the trade creation effects are of trade agreements between the EU and the rest of the world. Secondly, in a time when bilateral and plurilateral trade agreements cover an ever-increasing number of trade flows and policy domains, we studied the negotiation process of FTAs. In particular, we tried to find factors determining the liberalization process of goods in FTAs. Three findings stand out.

1. Trade agreements stimulate trade between the member countries of the agreement. We confirm these findings on the country- and product-level, as well as on the firm-level using Belgian firm data: trade agreements hold great possibilities for firms, and firms make use of them. Yet, there is large heterogeneity in the effects of trade agreements: trade agreements with deeper integration stimulate trade more, as well as trade agreements that were concluded for economic reasons. Moreover, it are mainly older firms that take advantage of the opportunities that trade agreements bring, as well as firms with 50 to 99 employees.

2. Anticipation effects of trade agreements are much more important than assumed so far. We again confirm these findings on the country-level as well as on the firm-level. Firms anticipate trade agreements by starting to export more to this destination from the moment negotiations of the agreement start. Moreover, we find that the number of firms exporting to destinations with (potential) future trade agreements also starts increasing from that moment.

3. Goods that are excluded from liberalization in trade agreements have a higher export supply elasticity (or so-called market power) and have a higher probability of belonging to a sector that is import-competing and politically organized to lobby the domestic government. When one country excludes a good from liberalization in a trade agreement negotiation, it is more likely that the partner country in the negotiations will also exclude the product from liberalization. Moreover, while it is commonly assumed that small countries cannot influence world prices for any good, we find that even small countries have market power for certain goods.

We contribute to the literature in three main ways. First, we present additional evidence on the importance of heterogeneity in the international trade literature. While it is now commonly accepted in the literature that firms are heterogeneous, we empirically show that different types of firms react differently to trade agreements. Moreover, we contribute to the literature on the timing of trade policy effects by providing empirical evidence on anticipation effects of trade agreements. Finally, we contribute to the terms-of-trade literature by providing the first empirical evidence

supporting the terms-of-trade theory in the context of bilateral trade agreements.

Implications for policy and research

This dissertation has several implications for policy-makers as well as for researchers.

First of all, our findings suggest that researchers studying the effects of trade agreements should pay more attention to anticipation effects of trade agreements. While we find clear evidence of anticipation effects, studies taking anticipation effects into account when evaluating trade policy are scarce. This might underestimate the effects trade agreements have on trade flows. Moreover, ignoring anticipation effects will result in misleading findings about the timing of trade policy effects.

Second, governments should do more to stimulate micro-sized firms and small firms (i.e. firms with less than 50 employees) to take advantage of the opportunities that trade agreements bring. Our results show that these very small firms do not manage to benefit from trade agreements, even though there are plenty of resources available on the EU-level as well as on the level of the Member States to help firms export[4]. Moreover, studies have shown that export promotion works (see Van Biesebroeck, Konings, and Martincus Volpe, 2016 for the case of Belgium), and that these positive effects can be particularly powerful for small firms (Lederman, Olarreaga, and Payton, 2006). This suggests that small firms might not make use of the help provided by the EU and the export promotion agencies on the more local levels. I therefore think that export promotion agencies should act more proactively with respect to very small businesses. Moreover, as we have shown that firms anticipate trade agreements, export promotion agencies should signal the potential of future trade agreement well ahead of the potential entry into force of agreement.

Third, our research provides a guideline for negotiators of trade agreements. Our results can be used to help understand the negotiation objectives of the partner country better before the negotiations start. By identifying goods with high and low market power and import-competing sectors with strong lobbies, negotiators can predict better which goods will be more difficult to liberalize.

[4]The EU provides very detailed information on various trade-related issues through its European Small Business Portal. Most EU member states also have national, regional or local trade promotion agencies assisting firms with exporting. In Flanders for example, Flanders Investment and Trade (FIT) helps firms to export by providing information, contact persons and a network in (potential) export destinations and even subsidies for trade shows.

Future research

While this dissertation tried to answer some questions, inevitably many questions remain unanswered. We see four exciting research areas that deserve more attention.

While we advanced the literature on anticipation effects of trade agreements by providing empirical evidence on anticipation effects, our results only include trade agreements between the European Union and the rest of the world for the period 1988-2013. It would therefore be interesting to see if these effects also occur when extending the sample of trade agreements studied as well as the time period. Moreover, it would be useful to refine our results: are the effects driven by the intensive or the extensive margin of trade? Are there other sources of heterogeneity with respect to anticipation effects? Do media coverage or political uncertainty mediate the magnitude of the effects? Which types of firms are more proactive and anticipate trade agreements more? Is the effect similar for all sectors and all types of goods?

Further, we see a potential fruitful nexus between research on anticipation effects and lobbying in trade negotiations. It would be interesting to combine both strands of literature, as both are sides to the same coin. Firms that lobby trade negotiators probably not only do so to obtain desired concessions in the trade negotiations, but also to obtain information on the progress of the negotiations and the specific opportunities the future trade agreement will bring for them. I therefore expect that these firms will be the firms that enter this destination ahead of time or expand their product range to this destination, taking advantage of first-mover benefits. At the same time, firms that anticipate trade agreements are extra motivated to lobby the government and make sure that their expected gains from the trade liberalization will materialize.

Moreover, it would be interesting to refine and extend the results of chapter 5 in a number of ways. Chapter 5 was a very exploratory paper, and hence there is plenty of room for improvement. First of all, it would be very interesting to refine the measures of lobbying used in the chapter. The only paper we could find so far that does so is Hakobyan, Kohl, and Lake (2017). However, they only look at US trade agreements, because of data requirements to measure lobbying. This brings us to our second point; it would be interesting to extend our analysis to include a greater number of trade agreements. This would allow for the study of differences in bargaining power of negotiating nations. While it is commonplace for law scholars to state that the EU or the US possess a lot of bargaining power and can therefore impose their templates of desired trade agreements, convincing empirical evidence to support this statement is lacking.

Finally, this dissertation has completely ignored trade in services. While we did so for data reasons – quality data on trade in services on the country-, product- and firm-level is not available for a substantial number of years

or countries – this is an area in the literature with great potential as not much empirical evidence is available on the effects of trade agreements on the trade in services, while a growing number of trade agreements include provisions on trade services.

- The End -

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